



CHEETAL

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Nanda Devi Sanctuary

—Photo by Anup Shah



Members and Subscribers are requested to note that all yearly subscriptions fall due on 1st of April each year. They are requested to pay in time so that Cheetal may be sent to them regularly.

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Honorary Secretary.

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NOTES

1. The Himalaya Sewa Sangh organised a seminar on "People and Forests" of Western Himalayas at the Forest Research Institute, Dehra Dun in January, 1977. Shri P.D. Stracey, I.F.S. (Retd.), a founder vice President of the Society, Shri S.K. Sinha, I.F.S. (Assistant Secretary) of the Society and Dr. B.S. Lamba, Deputy Director, Zoological Survey of India, Northern Region—an Executive Councillor of the Society presented papers on the urgent need of conservation of Himalayan fauna and flora. The seminar recommended that urgent attention should be paid to prevent the further destruction of Himalayan Wildlife.
2. The International Symposium on Tiger proposed by the Government of India would have focussed national and international attention on "Project Tiger" but due to unavoidable circumstances it has been postponed to November-December, 1977. We wish the Symposium all success. If it is found feasible the society may publish a special issue of "Cheetal" on the occasion.

Obituary

The Society condoles the sad and sudden demise of the Patron-in-Chief His Excellency Shri Fakhruddin Ali Ahmed—President of India who breathed his last after two massive heart attacks on Friday the 11th February, 1977. A wave of grief and sorrow swept the nation as the A.I.R. broke the news.

As a symbol of India's rich varied and composite culture, he commanded the respect, love and admiration of his country men. Glowing tributes were paid to him by leaders national and international. He was a wise statesman, an able administrator and devoted to peace.

In his sudden demise the Society has lost its Patron-in-Chief who was ever ready to help the cause of preservation of our fast vanishing wildlife heritage with his wise advice and guidance. The Society conveys its sincere condolences to the bereaved family.

**President's Speech on 17th October 1976 at the 18th Annual General Meeting
of the Society at Dehra Dun Club at 4-30 P.M.**

Guests and Friends:

It is my proud privilege to welcome you all and Shri B.N. Chaturvedi, I.F.S., Chief Guest, to this 18th Annual General Meeting of the Society.

The problem of conservation of wildlife has become all the more difficult during the last quarter of a century because of the denundation of forest areas resulting in the loss of habitat.

Conserve forests and you conserve wildlife.

Thanks to our Prime Minister, the last two years have seen a welcome change and with the twenty point programme emphasis on conservation of forests and plantation of trees, wildlife will be better preserved.

Forests and wildlife will be in the Concurrent List in our constitution in the very near future. This will result in uniformity of forest and wildlife legislation.

Of late all of us have noticed that there is greater awareness in the people about the preservation of wildlife. To this awakening the Society has contributed its mite, however, small it may have been.

The Society through its journal 'Cheetal' and by other activities such as organising trekking expeditions, essay competitions, exhibiting wildlife films, organising lectures on wildlife and wildlife research, encourages all, particularly the younger generation to preserve our vanishing wildlife heritage.

The Society finds representation on the various Wildlife Advisory Boards and brings to the notice of the Governments the difficulties faced by wildlife and suggests solution for the problems.

I wish to bring to the notice of all with all the emphasis at my command that wildlife must be protected efficiently—legislation alone will not be enough. All the management, research and publicity for conservation will be fruitless if wildlife can not be protected. Protection is the need of the hour. Tomorrow may be too late.

CHEETAL

Journal of The Wildlife Preservation Society of India

Vol. XVIII

September-December, 1976

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Ngorongoro : an African Safari

By

DR. KARAN SINGH

Chairman, Indian Board for Wildlife

The word sounds like an echo of African drums, but drums were the only feature missing during our four-day Safari of the famous Tanzanian wildlife reserves. After an hour's flight from Dar-es-Salaam we landed at the newly constructed Kilimanjaro airport. This has been designed as a major point of entry for tourists lured by the richness of Tanzanian wildlife, but for some reason it has still not caught on and remains somewhat forlorn and deserted. We set off on our trip in a Range Rover; Solomon Ole Saibull, the dynamic Tanzanian Minister for Tourism and Natural Resources who has spent a life-time in wildlife conservation, having been Director of National Parks for several years; our High Commissioner in Tanzania K.D. Sharma, and myself. For the first hour we drove through barren country until we passed the important town of Arusha and, soon thereafter, turned into the famous Arusha National Park. This is situated around the foot of Mount Meru (pronounced exactly like the Meru of the Bhagwadgita, X. 23), and the air was cool and crisp. Soon after we entered the park we saw a large group of black and white Colobus monkeys swinging from tree to tree, crossing the road about fifty feet above our cars. These monkeys have beautiful bushy tails and look more like birds as they gracefully swing from branch to branch, black except for their white tails and wise little faces. Later we came across a number of Olive Baboons. The Arusha Park has several lakes, and beyond them in silent and majestic splendour, stands Mount Kilimanjaro—the shining mountain—highest in the whole of Africa. Although it is virtually on the Equator its peaks are always covered with snow, and in the evening sun it looked like a huge brooding mammoth waiting for some cosmic signal before springing to life again. We alighted from the Range Rover on the edge of one of the lakes, just as a flock of Egyptian geese flew towards us from the direction of

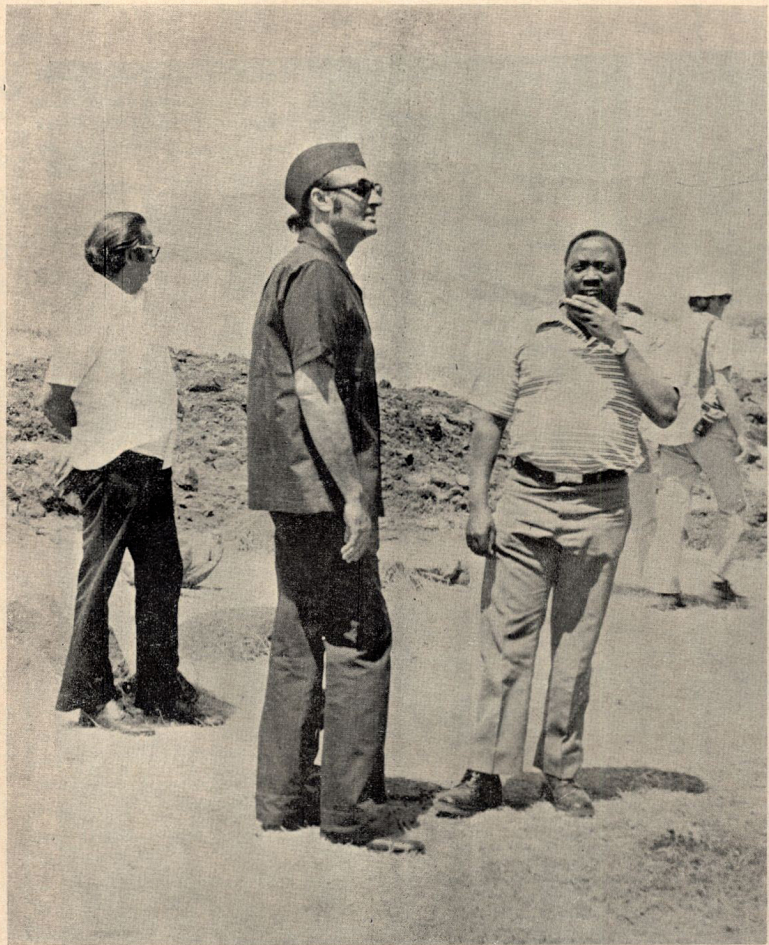
Kilimanjaro and swept down low over the water. It was one of those magical moments when time seems to stand still and the whole scene gets imprinted into one's memory. The waters of the lake, the grandeur of the great mountain in the background, and the birds with their graceful movements were a marvellous introduction to Africa.

Minister Saibull is a well-known authority on wildlife, and in his company we were able to enrich our store of information regarding African wildlife immeasurably. He belongs to the famous Masai tribe, the legendary warriors whose courage and fighting prowess saved most of East Africa from the slavery that tribes in other parts of Africa so cruelly underwent for centuries. The Masais from their very childhood are brought up in the tradition of warriors, and courage is given the highest value. Although times are changing fast, the Masai generally still stick to their traditional dress complete with spear and tribal ways. Indeed most of the national parks in the country have been carved out of areas that previously belonged to the Masai, and it is a tribute to the wisdom of the Tanzanian leaders that this has been effected with so little tension. Another aspect of the Minister's personality which came to me as a pleasant surprise was his keen awareness and interest in political theory. He is a student of Marxism and is attempting to interpret it in terms of the requirements of his fast developing nation. On the many hours that we were together, therefore, our conversation revolved around these three themes—wildlife, tribal lore and political theory. As we sat around the fire in the Momella lodge at the foot of Mount Meru before and after dinner, I found it fascinating to be in the midst of the African wild and in the company of intelligent young people dedicated to building a new Tanzania and new Africa.

The next morning I took a walk to the Hippo pool about a kilometre from the lodge. Except for a huge giraffe that barred my passage for a few minutes, there was not a soul in sight, and for the first time I felt what it was like to be alone in the midst of that extraordinary continent. The hippos were having their morning swim in the pool, ungainly creatures which look harmless enough but can be very nasty if one gets between them and the water. After breakfast we set out on the road to the Lake Manyara National Park, four hours' drive away. The bulk of Tanzania seems to be very dry, almost desert like. I was told that in fact the country was experiencing an unprecedented drought that had lasted for four years. While driving strange, dark whirlwinds 20 to 30 feet high would develop, sometimes within a few yards of the road, and whirl across the plain as if possessed of some demoniac energy. It is no wonder that they have been associated in the folklore of almost every country with malevolent spirits. We finally came to the Lake Manyara lodge situated on a hill overlooking the lake, one of a chain of wildlife lodges constructed by the Government of Tanzania since their independence which provide a level of comfort



Outside the Ngorongoro Wildlife Lodge the author is flanked by the Tanzanian Minister of Natural Resources and Tourism, H.E. Mr. Solomon Ole Saibul, the Indian High Commissioner in Tanzania, Shri K.D. Sharma, and other Directors of the various Wildlife Sanctuaries in Tanzania.



The author accompanied by the Tanzanian Minister of Tourism and Natural Resources and his Personal Assistant watching the Wildlife in Ngorongoro Crater.

that can compare with the best international standards. The huge lake had shrunk considerably due to the drought, leaving vast areas of soda encrusted land which looked like a sea beach. We put off our visit to the park for the return trip, as we were anxious to get our destination—the fabulous Ngorongoro Crater.

After lunch we drove for another two hours along a not very satisfactory road, until we reached the edge of the Crater, its wooded rim rising high above the endless plains of the Serengeti. The Crater is a perfect oval, a hundred square miles in area and 2,000 feet deep, rather like a miniature Kashmir valley. On the floor of this crater is a unique animal world, virtually untouched for thousands of years. Happily no construction is allowed on the crater floor, but on the rim there are several excellent lodges. We got into the lodge just as evening was deepening, and were greeted at the entrance by a group of Tanzanian folk singers who serenaded us with some lively local songs. The lodge commanded a magnificent view of the crater, whose thickly wooded walls dropped down almost directly from below our windows giving the dramatic feeling of living actually on the edge of the crater and being able to see the whole area from the vantage point of an eagle. I was accommodated in the Crater Suite which has the drawing room on the ground floor and the bed room at the top of a flight of steps. The view from there was extraordinary, and as the night deepened and the stars came out against the velvet of the African sky, one was transported into another age and another world far from the din and bustle of daily life, the constant goading of political activity, the unceasing challenge of administrative problems. Here one was back again where man had begun his quest millions of years ago, but with the inestimable advantage of those million years of evolutionary development. The human psyche is today capable of comprehending in a much deeper fashion the mystery of existence, and I sat for long trying with the help of a simple meditative technique to shed the intellectual baggage with which we are all burdened and to rediscover a sense of the immediacy of silent awareness.

I awoke the next morning to a crunching, shuffling sound and looking out of my window saw three wild tusked browsers browsing peacefully within a few metres of the lodge. These huge creatures need so much food that their entire life is one long meal. We started our descent into the crater after an early breakfast. It took us about an hour and a half to negotiate the steep incline and to get to the floor of the crater, a high saucer teeming with wildlife, after which we spent the entire day driving around the crater viewing the animals and birds that inhabit it. Apart from thousands of wildebeest, zebra and gazelles of various kinds (Thomson's, Grant's, Impalla) we came across some of the more dramatic denizens of the crater world. The rhinoceros is clearly a hangover from a bygone age, a creature so totally improbable as to be almost absurd. We drove to within a few yards of two of these beasts, one of whom looked as if he was on the verge of charging our vehicle.

The bird life of the crater is also very rich, and we saw among others the Kori Bustard, the Secretary Bird, the Crested Crane, the Maribou Stork, the Goliath Heron and the beautiful Fish Eagle with its white face and black body. These are all large birds, many of them difficult to see outside Africa, and it was fascinating to be able to see them all within the course of a few hours.

After driving for about three hours we came to an oasis, a small pool of clear water upon which an ancient tree grows, the fig tree, sacred to the Masai tribe. We stopped here for our packed lunch, which we ate sitting on the rocks next to the pool. While we were eating a whole cloud of Superb Starlings descended from the tree like a shower of autumn leaves, beautiful little birds with bright blue feathers, and stayed with us throughout the meal pecking away at the crumbs. A large herd of wildebeest came from the other side of the pool to drink. The most populous of African animals, these antelopes look ungainly and rather foolish, and they approached the water only after many false starts and panics. They were followed by a herd of zebra, sleek and much more self-possessed. After lunch we resumed our drive around the crater, during which we encountered the handsome Eland, largest of the antelopes, and the tiny Dik Dik, smallest member of the species. We also saw a pair of bat-eared foxes, strange little creatures with huge ears and tiny faces, lots of blue monkeys and herds of wild buffaloes.

Finally, we came upon a pride of nine lions lying around on a rock, females and young males resting in the heat of the afternoon. A little further on we came across the king of the forest himself, the magnificent African Lion known—as in the Sanskrit—as ‘Simba’. He was sitting along with a female under the shade of a tree, and we drove up to within a few feet of them. Apart from lazily looking up at us the animals did not move for many minutes. It was fascinating to watch this glorious creature from such a close distance, his noble profile and flowing black mane combining to give him a truly regal appearance. After about ten minutes both the animals got up, as if in response to some unspoken command, walked off lazily to another bush about 20 metres away and lay down again. The lion is an unabashed male chauvinist, sleeping for as long as eighteen hours a day while the lionesses do all the hunting and hard work. In the remainder of our trip we came across several more lions, making a total of twenty-one in the whole day.

By the time we started our return drive up the crater wall it was already getting on to six o'clock, and when we reached the lodge it was dark. The memory of that strange isolated world of the crater will linger for a long time. It was as if one had visited a different world, totally cut off from our planet and obeying a different scale of temporal values. Minister Saibul was responsible for resolutely opposing a proposal made by a foreign company to build on the floor of the crater, and we in India can draw a lesson

from this. We have the tendency to build too close to the heart of our sanctuaries, thus causing permanent disturbance to the wildlife habitat. It is often forgotten that the ecological balance is a very delicate one and that man, the most destructive of all living creatures, must tread warily if he is not to destroy his fellow creatures. Indeed the destruction of the human environment that has been caused over the last few decades in the name of technological progress has been quite terrifying, and only gradually is the awareness growing among the nations of the world that Spaceship Earth is essentially a single bio-unit whose ecology can be destroyed only at grave long range risk to the human race itself. As Indira Gandhi said the other day, a world in which animals cannot live will soon become unfit for human habitation also.

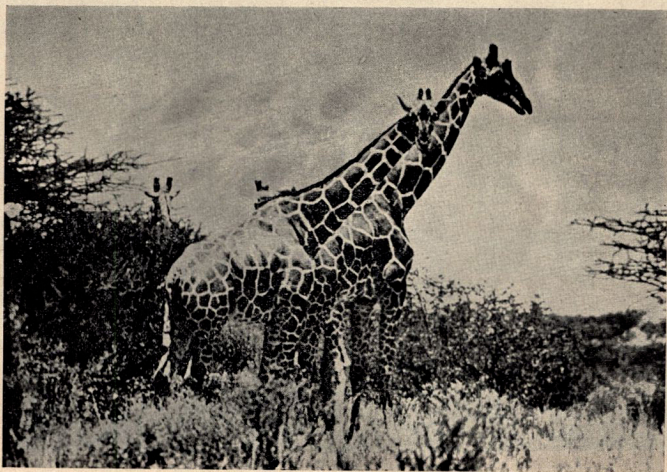
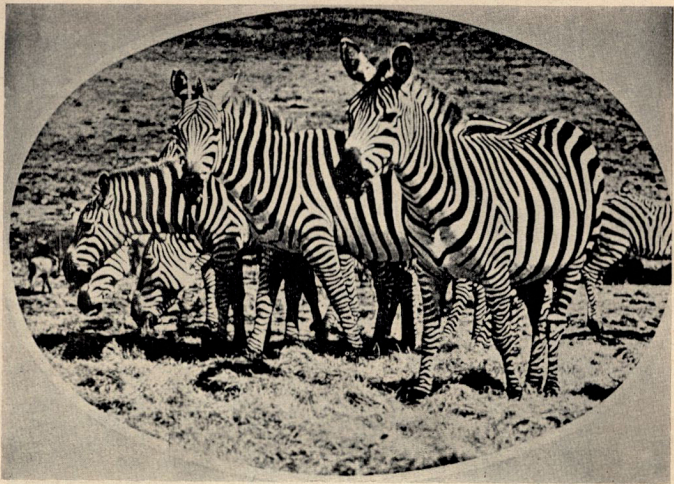
After another night at the Ngorongoro Lodge we drove back to Lake Manyara and visited that famous park. The two predominant animals there were elephants and hippopotamus. Within two hours we saw dozens of the gentle giants including large tuskers, mostly in groups of four or five. The ears of the African elephants are shaped differently from the Asian ones, and unlike ours the African elephant has never yet been successfully domesticated. These lordly beasts walk with a tremendous natural dignity, a characteristic that was not lost upon our ancient poets for whom the greatest compliment to a woman was to say that she walks like an elephant. In comparison, the hippopotamus is a weird, ungainly creature which remains almost entirely submerged in water except for its pointed ears and large, protruding eyes. In Lake Manyara we saw literally hundreds of them, piled up against each other like so many inflated balloons. We also came across a number of giraffe, looking down at us superciliously from their great height, while delicate Vervet monkeys scampered around the bushes. High on one tree a solitary Baboon sat surveying the entire park as if he was some sort of functionary making quite sure that poachers do not enter the reserve.

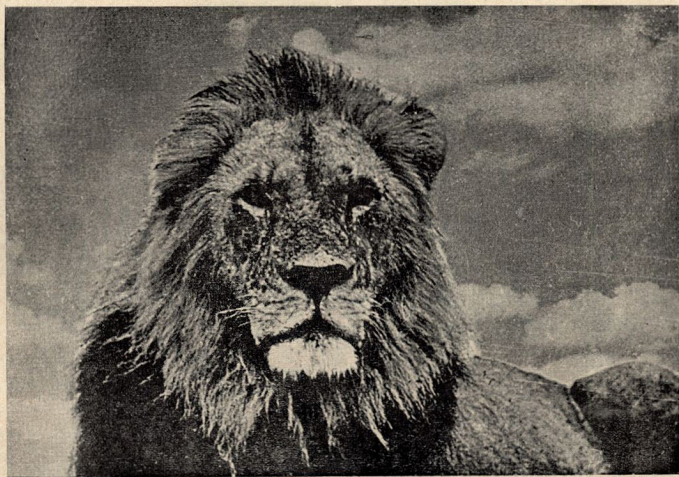
After the visit to the park we came back to the Lake Manyara Lodge, had lunch and drove to Arusha past the newly constructed Tanzanian Military Academy. Our last night in Africa was spent at the Tanzanite Hotel between Arusha and the Kilimanjaro airport, next to which is a mini zoo where we could see in captivity a number of the animals and birds that we had seen in the park. There is a world of difference between an animal in captivity and in the wild, and it is always sad to see imprisoned animals. After dinner we all sat around discussing the future of Africa. There are new winds of change sweeping across that great continent as the struggle against white colonialism enters its final phase. My visit coincided with the meeting in Tanzania of Presidents of five of the frontline nations to consider steps for hastening the liberation of Namibia and Zimbabwe. There was a conviction that both these nations would be free before the end of next year, and that

even in South Africa events would move more swiftly than most people imagine. I was deeply impressed by the young Tanzanians with whom I came in contact. Intelligent and dedicated, they share with us the determination to free their nation from all vestiges of domination and colonialism, and to see in their lifetimes the total eradication of apartheid from the African continent.

As far as wildlife is concerned, East Africa remains unique in the density and variety of animals and birds that they have been able to preserve. Directors of our own Project Tiger reserves have visited Kenya and Tanzania to benefit from their experience with regard to wildlife management. Our topographical conditions, of course, are very different; while Africa is largely open scrubland and sparse forest the Indian jungle is much thicker and presents qualitatively different problems. However, the basic concepts of wildlife management are common, and there is a great deal to learn from the East African experience.

Being among natural surroundings is an invigorating and reintegrating experience. Man, despite all his sophistication, remains a denizen of the earth and must periodically renew his contacts with nature if he is to develop in a harmonious and mature fashion. Much of the eccentricity of modern man flows from his lack of ability to commune with nature, to draw sustenance from the elemental powers of air, water and earth. Apart from the intrinsic value of wildlife preservation in maintaining and improving the natural environment of our planet, the very real benefits that can be derived from a contact with the wild are seldom appreciated. My African safari brought this home to me with renewed insistence. National parks and sanctuaries are a valuable part of our heritage, and our generation owes it to posterity to pass on to them a better environment than the one we inherited. In our cultural heritage there has always been a deeply sensitive reverence for life and the natural environment. Some of the most beautiful Vedic hymns sing of the beauty of mountains and forests; trees and rivers; animals and birds. In the new India that we are striving to build it is important not to lose this awareness in the processes of economic development. Otherwise, like so many of the affluent nations, we will wake up only when it is too late and something precious in our heritage has disappeared never to return.





Nandadevi—the highest Peak in India

The Nanda Devi Sanctuary

By

ANUP SAH

General:

During September-October 1974, the Naini Tal Mountaineering Club (NTMC) organised its second major expedition "The Indian Nanda Devi Sanctuary Race-cum-Climbing Scientific Expedition-74". I was burdened with the responsibility of leading this Expedition. The Naini Tal Mountaineering Club, Naini Tal is now contemplating to organise the first expedition in the series of 'Multidisciplinary Scientific Exploratory Expeditions' into the Nanda Devi Sanctuary, the highest sanctuary in the World, as soon as opportunity is made available. More than 19 institutes and organisations of national level including universities have desired to participate in these scientific expeditions to the mysterious and unexplored Nanda Devi Sanctuary. The present Reconnaissance Expedition was with a motive to make a preliminary survey of the area in order to spot out the specific locales of research for the forthcoming expeditions and also to assess the difficulty of the approach march for the scientists desiring to participate.

Geological Topography:

The Nanda Devi has for long centuries been worshipped as one of the holiest mountain in India. Even foreign Mountaineers have paid homage to it. It is not only unique in other respects but because of its Geological topology also. Right around the peak, encircling it, there is a vast ring of mountains 70 miles in circumference, forming an impregnable wall, like a natural fortress, the average height of which is over 6,000 m/20,000 ft. There is no known depression along the ring of mountains below 18,000 ft. excepting on the western side where the Rishi Ganga rising from the Northern and Southern Glaciers of Nanda Devi finds its way out. All this area, comprising of romantic Alpine meadows, rivulets, hillocks, valleys, colourful boulders, different types of fauna, inside this magic circle of mountains, which covers an area of not less than 250 sq. miles is known as 'Nanda Devi Sanctuary'. Such a Geological arrangement is unique in the world. It was so named by Hume Ruttledge whose three attempts to enter it had failed. It is not a man made sanctuary but a God made Sanctuary because no man had ever entered this area perhaps from the beginning of the earth and such is the approach now discovered by Eric Shipton and H.W. Tilman in 1934 that only men with extra guts and one pointed zeal can go there after organizing a well planned Expedition.

History:

In 1883 W.W. Graham, was the first to attempt an entry into the 'Nanda Devi Sanctuary'. He could only descend upto a point where the Rishi Ganga and the Trishul Nala meet. All this area became to be known as the 'Outer Sanctuary' as there was still an impregnable region which they called the 'Inner Sanctuary'. Since then it has been a cherished dream of mountaineers from all over the world, to descend into the Sacred Nanda Devi Sanctuary and go to its base. Twenty years later Dr. T.G. Longstaff was the first human being ever just to peer down into the virgin landscape of Inner Nanda Devi Sanctuary. Eric Shipton along with H.W. Tilman, was the first to find a way into it in 1934 by forging the most formidable path anywhere in the world after full 50 years of successive trials and failures by several expeditions from several countries. After the discovery of this route some Indian and foreign expedition (nearly 7) have been organised to Nanda Devi through this only known route.

Route:

From Naini Tal you have to go via Ranikhet to Joshimath, Tapovan and Lata which is the last motor link for Nanda Devi. Or you can come here from Hardwar, Srinagar, Joshimath and so on. Lata village is your last link with the outer world. Beyond this eight days of very tough climbing and descending begins along a precarious route. In some places there is a sheer drop from 1,000 to 3,000 ft. The way goes through the very narrow and dangerous gorge of Rishi Ganga. On the way we have to fix ropes at several places. Beyond Lata the route goes via Lata Kharak, Dharansi, Dibrugheta, Deodi, Ramni, Bhugarh, Patal Khani and Sarso Patal (Base camp).

Wild Life:

Beyond Lata village the whole 8 days trek is full of wild life. We have seen and identified Musk Deers (*Moschus moschiferus*), Bharal (*Pseudois nayaur*), Flying squirrels (Species not identified), Hyraxes (*Procavia* sp.) and a few birds like Cheer Pheasant (*Catreus wallichii*) Monal Pheasant (*Lophophorus impejanus*). The Himalayan Snowcock (*Tetraogallus himalayensis*), Snow Pigeon (*Columba leucotis*), Yellow-billed chough (*Pyrrhocorax graculus*), Jungle crow (*Corvus macrorhynchus*), white tailed Nuthatch (*Sitta himalayensis*), The Himalayan Greenfinch (*Hyphantornis spinoides*), the Himalayan whistling-Thrush (*Myiophobus temminckii*) white capped Redstart (*Chamaea leucocephala*), the spotted Forktail (*Enicurus maculatus*), the Himalayan tree Creeper (*Certhia himalayana*), the striated Laughing-Thrush (*Trochalopteron lineatum*), the Red headed Tit (*Aegithaliscus coninnus*), the Black Tit (*Lophophanes melanolophus*), the Green Backed Tit (*Parus monticolus*), the Himalayan Red crowned Jay (*Garrulus bispecularis*), the Himalayan Black Throated Jay (*Garrulus lanceolatus*),

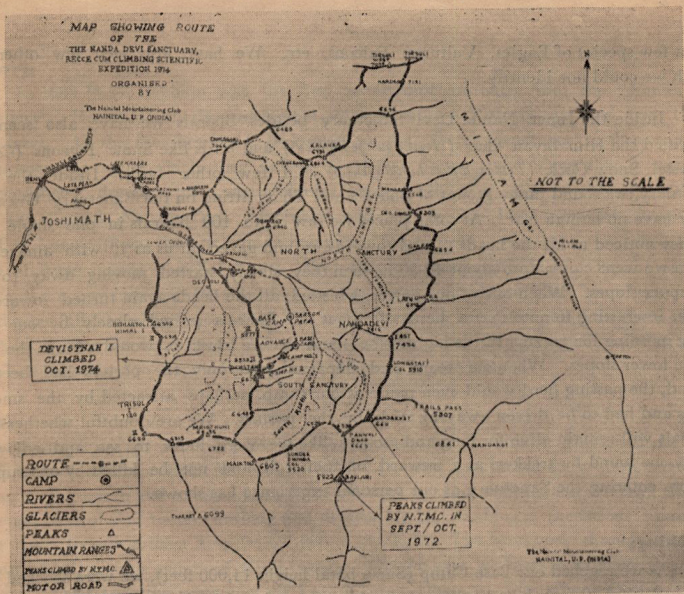
and a few species of Eagles, Vultures, Falcons, etc. We have also seen few other birds which we could not identify.

Inside the Inner Nanda Devi Sanctuary besides Bharals we have also seen and identified the Himalayan Thar (*Hemitagus jemlahicus*) and birds like Snow Pigeons (*Columba leuconota*), Snow Cock (*Tetraogallus himalayensis*) and few other birds. Inside the Inner Sanctuary, we found many groups of Bharals and Thars sitting on the Sanctuary Grassland. They have no human fear. At some places we saw upto 100 Bharals in one single herd. As they noticed us all the heads turned towards us, and gazed at us as if with amazement. When we went closer upto about 40-50 ft, then they slowly started moving away towards the upper slopes. When one of our porters whistled, all the heads again turned towards us. It was interesting to note that a herd of about 25 Bharals passed closely by our camp every morning for grazing in the higher slopes and before dusk it would return the same to the lower slopes. When our team had departed and only the porters had been left behind, the passing herd would even pause at our camp, perhaps attracted by the smell of stores and had to be driven away by sticks by the porters. We are doubtful whether these animals will remain alive for long and scenes like we were lucky to see and enjoy will always be found by trekkers as a reward of their toil and not be killed by unscrupulous persons entering the Sanctuary as our personal experience has shown.

Poaching:

As we reached our Base Camp (Sarso patal height 14,000 feet), we were shocked to see a few skulls of Bharals killed by poachers. In all we found 10 skulls of Bharal and a pair of markhor horns in different camps. A foreigner describes this area as a "Sanctum Sanctorium of the Goddess Nanda Devi and the other declared it a Sanctuary. H.W. Tilman writing in his book. "The Ascent of Nanda Devi"—says "Shooting for the pot may in some circumstances be necessary but in the Sanctuary both sentiment and expediency are strongly opposed to it". In the same area an Indian goes and does such indiscriminate killing. It reflects on our moral sentiments and sincerity of our faith in religion and God. Really it is very shameful for us. I have come to know that after our expedition in October, 1974, one more expedition has also gone and done unbridled killing in this Sanctified area. One of my friend of Seth G.S. Medical College, Bombay also brought in June 1975 a head of freshly killed Bharal from the outer Sanctuary, left there by some poacher. Some of the Local porters who generally go with expeditions also carry guns with them.

Now the entire Nanda Devi Sanctuary area is open for foreigners. Only this year about 7-8 expeditions visited that area. It is very very necessary to take early step to stop poaching in this area. My suggestions are as follow:



1. Forest Department should check and not allow any expedition and local porters to carry guns beyond Lata village.

2. Indian Mountaineering Foundation (IMF) should be asked not to allow any expedition to carry guns to the area and should be asked to issue clear instructions to each and every expedition in advance not to carry guns to the area and if any are brought by mistake, they should be deposited at the check posts.

3. Heavy penalty should be imposed if it is proved that a person has been responsible for poaching in that region.

4. Educative literature on importance of Wild Life preservation should be freely circulated amongst people entering the sanctuary.

And I think this way we can stop poaching of the whole area very easily. As there is only one way to enter the Outer and the Inner Sanctuaries and the nearby mountain area, it will not be a difficult task to exercise vigilance at this end.

This is a very serious problem and requires the attention of all animal lovers and organisations and the Governments State and Central. Once this boon by nature is lost it will be difficult or rather impossible to recreate it.

Humbled Monarch

By

M.F. Ahmed

Formerly Lecturer, Indian Forest College, Dehra Dun.

Under the auspices of Project Tiger a three week training programme on "Tranquilising and Telemetry" was conducted from 6th April to 23rd April, 1976 for the first time in the country. The course commenced with theory lectures at the Forest Research Institute and Colleges, Dehra Dun and practical demonstration given at Chilla (U.P.); Bharatpur and Sawaimadhopur (Rajasthan). Tranquilising and Telemetry, both subjects of applied science are of very recent origin and frequently adopted in foreign countries for study and research in Wildlife Management.

There were 17 trainees for the course which included mostly Forest officers, game managers and veterinary surgeon. Sri S.K. Sinha and myself were two participants from Indian Forest College. The trainees had the benefit of undergoing this unique training under two experts from U.S.A. The experts were sponsored by World Wildlife Fund International as a part of aid programme to Project Tiger. They are Dr. U.S. Seal for Tranquilising and Dr. David Mech for Telemetry.

The experts had very wide experience in their respective fields. They had brought with them all the required equipment and drugs.

Ranthambore Sanctuary near Sawaimadhopur is one of the Tiger Project areas where we were undergoing the training course in the last lap. The terrain and vegetation were ideal to track the animals, tranquilise them by darting and putting the transmitters (electronic gadgets) round their neck. Later on the collared animals could be tracked by a receiver and a special type of aerial (hand held Yagi antenna).

There are various kinds of drugs to tranquilise different animals. The drugs are of different chemical compounds reacting differently with different animals. Some suitable drugs for certain animals are not advocated for use for other animals because of their reaction to the drug. So also the drug dosages vary with the species of the animal, sex, health and age of the animal (weight). The drugs can be administered by inhalation, injection and oral means. In wild animals in free state in forest, the most ideal is injection either by darting with dart gun or sticking (if near and approachable). The drugs react on the animals in stages, mainly four, namely analgesia (pain killing), lixum (excitement), anaesthesia (muscular relaxation) and respiratory paralysis with circulatory collapse. The fourth stage is usually avoided and once reached, antidote has to be given

immediately to bring back the drugged animal to life. The body temperature is an indicator of the condition of the animal at each and every stage. Therefore, the animal has to be watched carefully, particularly after it is immobilised, so that no life is lost due to carelessness or due to laxity. The primary factor with tranquilising, is the ANIMAL (the life of the animal) itself, and all the rest are secondary. The normal time of recovery depends on the dosage and physical condition of the animal.

Ketamine is one of the many drugs used to tranquilise wild animals. It is one in Phencyclidenes group like sermylan and G I 744. This group gives convulsions after administration. Ketamine is rapidly effective and has less side effects. Ketermine is a suitable drug for the species of the following families Primates (all Macaques, Gibbon, Langurs and Loris); Pholidata (Pangolin); Carnivora (jackal, Fox and Wolf); Procyonidae (Red Panda), Mustelidae (other, Martens, Wcasels, Hog badger and Ratel); Viverridae (Civets, Toddy cats, Bintusong, and Mongoose); Felidae (cats, Leopards, Cheetas, Tiger and Lion); Insectivora (Shrews, Moles and Hedgehogs), Rodentia (Rats, Mice), squirrels, Porcupines) and Logomorpha (Hares). Ketamine is better and safer drug for carnivores than for primates.

It was a very pleasant cool morning of Tuesday, the 20th April, 1976 at Jogimahal in Ranthambore sanctuary. The sun was still to greet us above the eastern hill. The experts along with we trainees were ready to start off for the days job. By then we had already darted successfully ferral cattle, cheetal, sambhar and neelgai during the course of training period.

On one side of Jogimahal is the large lake with placid waters and lotus carpet and on the other side is a large banyan tree with its thick large foliage. Often the breeze rustles past the banyan tree crown making a sonorous sound and sways the lotus flowers giving an enchanted sight. The banyan tree and fields nearby are frequented by birds and small animals. The perching birds on trees with their songs and coos make it ideal for bird-watchers to observe them from Jogimahal. The local forest staff stay near Jogimahal. The place is also very much frequented by visitors and pilgrims as a result lot of food material is made available to wild animals and birds. It is usual to see the feeding doves, pigeons, peacocks and langurs there. There was a big group of langurs in the neighbourhood of Jogimahal. Though they were wild, they were not shy of human beings due to the long association with people near Jogimahal. It is a pleasure to watch the ever alert langurs feeding on the generous offerings of food stuff by the people. Out of many langurs, the biggest was a full grown stocky male. It was considered almost the leader or king of the group. It also behaved like a leader daring to approach and taste first any food offered. It used to walk up gallantly to a man and pick up a banana or gram or a bread piece from the palm of the man. It had least fear of the men. Anything offered, it used

to grab the major share chiding others. So also other male, female and young ones were afraid of the big one and thought wise not to take liberties. It was rightly christened as the leader of the group by forest officials. True to the name, it was the monarch and used to enjoy the advantages also.

Dr. U.S. Seal wanted to dart the langur, black faced monkey (*Presbytis entellus*). Shri Fateh Singh Rathore, Asstt. Director Project Tiger and Game Warden of Sanctuary (one of the trainees amongst us) promptly suggested to get him with some eatables as bait. Darting the langur by a 'capchur' gun is almost impossible since it would bolt off no sooner the gun is lifted. Moreover in our case it was possible to approach a langur as in case of zoo animals in the cage.

Dr. Seal propped a dose of 6/10 c.c. of Kitamine—60 mg and fixed a syringe to a stick, specially meant for the purpose. Shri Fateh Singh threw some gram and bread pieces and held out some in his hand. The gallant monarch came straight for the palm offer while other langurs were scrambling for the food on the floor. The monarch stood up on toes and started eating from the palm of Shri Fateh Singh. Little it knew about the preparations going on nearby and was unconcerned about the whole world and for the time only concerned about the things on the palm of the game warden. We all were observing at a little distance.

0608 Hours—Dr. Seal went near Shri Fateh Singh and swiftly stuck the feeding langur on its left shoulder.

Surprised at this unexpected pinprick, the monarch withdrew a little, looked around curiously and sat down near the eatables lying on the floor. It remained there still for a few minutes and then started picking up eatables one by one and began eating. This grubbing continued for a little while.

The whole group went up the tree leaving behind the eatables and the leader, being alarmed at such a calm condition of this monarch. All were inquisitive and were watching the monarch from the spreading branches of the banyan tree. All were not much concerned but eager and keen about the affairs down under the tree.

The darted langur was gradually getting the effect of the drug and losing its senses.

0614 Hours—It had almost lost control over itself. Dr. Seal went near from behind and patted it. There was neither protest nor response. He concised his head and back. The langur was looking with open eyes but kept calm and quiet as if doped.

0616 Hours—Langur turned to its left and rested on its forearms.

The drug was just enough to immobilise an adult langur.

0618 Hours—Dr. Seal lifted the resting langur and guessed its weight to be about 45 lbs. (20 Kgs). On examining the skin spotted pigments were noticed.

0620 Hours—The langur was getting over the drug slowly. The effect of the drug had just started wearing off and was on the decline. The immobilising effect was faster than recovery.

All other langurs of the troop were watching atop the banyan tree.

0623 Hours—"Excitement" is the greatest enemy of darting. So on the advice of Dr. Seal we all withdrew further back not to scare the drugged langur and the monarch was all alone. The inquisitive other langurs were on the tree still watching. Some daring ones came down to observe their uncrowned king at close quarters.

0624 Hours—The darted langur started moving his forelimbs but the lower portion of the body was still and appeared heavy. It was slowly regaining senses and becoming responsive.

0625 Hours—One of the young male langurs came very near the darted male and observed him carefully. Then it picked up some bread pieces lying in front of the darted monarch. Seeing this other langurs, lower ranking in the group, came nearer and started eating. The humbled monarch was helplessly looking at them and they were having a jolly good time.

0628 Hours—The darted langur was gradually getting over the crisis. It could move its hands and turn its head. It tried to wipe the face but the fingers did not work well. The fingers were slightly cramped. Gradually its reflexes started working slowly.

0630 Hours—The langur turned and lifted its body with difficulty. It dragged its feet for a step and then sat down as if tired.

0631 Hours—Its endeavour to come to normal state continued and the effect of the drug was also on the decline. It again moved a few steps and slumped down.

0632 Hours—Seeing their leader moving the younger langurs withdrew a little. There was a cement pandal slightly raised near the base of the tree. Blocks of tree trunks were put over it for seating the visitors. The platform is about 40-45 cms high above the ground and the wood blocks are about 40-45 cms high above it. The langur went near the pandal and stood there for a few seconds. Then it tried to go up but could not lift its body. It sat down after failing to go up.

0634 Hours—The langur tried to go up the platform a number of times but failed due to paralytic effect on its hind quarters. The lower limbs were getting normal slowly and it tried to jump. Finally it clambered up the pandal and held the improvised chair for support. Thy langur could not stand further but sat down embracing the stump.

Other langurs came very close to the leader and touched its body. They felt him and appeared to be cheered seeing him getting over the crisis. Who would not be happy to find the leader safe and sound though occasionally one enjoys the leader humbled and humiliated.

0635 Hours—The darted langur was getting normal at a faster rate as observed. The different parts of the body started functioning normally but the progress was slow and the darted langur was a little sluggish.

The langur was getting over the drug effects gradually. Dr. Seal explained that the langur would take about half an hour for complete recovery. Seeing the leader langur nearly normal there was jubilation in the langur group in the form of jumping and brisk movement on the tree.

The sun had come above the eastern hills breaking the morning melancholy and its rays had started to pinch us. We all left Jogimahal for the forest for darting other animals and tracking collared animals by radio telemetry.

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Mahseer

BY

KAMAL SINGH

So much is being done for protection of wild animals and birds, volumes have appeared in the press of the activities of the World Wild Life Organisation and crores have been sanctioned for various projects all over India. It is alas unfortunate, that there has been not a voice in defence of the Mahseer, a valuable fish species, which for the last 30 years, has been subjected to merciless and wanton destruction.

The Mahseer, (*Barbus tor*) is a fresh water river fish, carnivorous in habit and growing up to 100 Lbs. or more in weight and found in all our rivers wherever the water is fast-flowing and the terrain is rocky. Normally, it is not found in slow sluggish waters in altitudes less than 1000 ft. above sea level. It spawns during the monsoon season and in habits, is somewhat like the Salmon of Europe and America for it must migrate into small quiet streams of the hills to lay its eggs. This is only possible when the rains swell up the smaller streams in the upper reaches and the fish can travel comfortably into these normally inaccessible waters. Thus, each year, in May and June, the Mahseer prepares to move up and keeps going up as the monsoon advances. By August or early September, the spawning is over and the fingerlings old enough to forage for themselves. The fish are now ready to come down and towards end of September, with the monsoon exhausting itself and the water-level falling rapidly, the downward rush begins. By October, all the fish are back in the major rivers and until next May, there they remain. And so the cycle goes on year after year.

The Mahseer is one of the world's finest sporting fish on which classics like "Circumventing the Mahseer" (MacDonald) "With Rod and line in India" (Thomas), "The Mighty Mahseer" (Skene Dhu), "The Compleat Indian Angler" (Masters), "Sunlit Waters" (Conway), to name only a few, have been written by British authorities. Anglers from all over the world have had the thrill of circumventing this noble fish and in our own country, there has been no dearth of keen and successful anglers. Rivers like the Jhelam, Chenab, Sutlej, Beas, Jumuna, Ganga, Ramganga, Sarju, Narmada, Tapi, Krishna, Indravati, Godavari, Cauvery, Mahanadi together with their tributaries and all the Assam rivers and those in Pakistan and Burmah have been famous names in Indian fishing annals.

Fishing with rod and line, particularly in heavy, fast waters (as in the Jamuna or the Ganga) the first rush of the Mahseer, when a 30 lbs. fish takes the bait and plunges madly

downstream, is the finest thrill one can ever have. It is certainly not a sport of "a stick and line with a fool at one end and a worm at the other" as depicted by Dr. Johnson. It is a sport that entails the utmost skill and ingenuity, unlimited patience and extremely hard-strenuous work, with movement all the time, casting the artificial bait 30 yards or more, and traversing endlessly over rocks and stones, often in the scorching sun of May and June. As a consolation for these ordeals, the sportsman is usually in idyllic surroundings with magnificent hills and forests, sometimes in remote areas of utmost beauty. On the other hand, fishing can also be had in easier conditions though not in such picturesque surroundings, e.g., near canal headworks as at Tajewalla on the Jamuna Canal or at Kulhal and Dalipur on the Asan Canal near Dehra Dun, which offers the sportsman, less of natural or scenic beauty.

All these joys and thrills were alas, for our forefathers, since today, there are very few potential and undisturbed spots left where one can enjoy a few hours of fishing. Sheer callous destruction has followed the fish everywhere it goes. In our father's time, the Mahseer suffered during its annual spawning exodus to the hills, where villagers in the upper regions armed with clubs, stones etc., would congregate at specific points (when the running was thick) and kill fish by cartloads. The water in the hill streams during June, is usually very low and it was the easiest things to pounce on the struggling mass of fish. The streams would even be poisoned by using TEJPATTA seed burnt into ashes, which has the effect of making the fish senseless over a wide area. Such "orgys" were (and still are) know as "Machee Ka Mela", a great event in the remote areas, whenever the arm of the law was not expected to reach in time. In those days, the law was strict and such open destruction was severely punished.

Today, it is not only the chance "Machee Ka Mela" in the hills (for very few Mahseer are left to travel up) but a continuous extermination by bombs, dynamite, small-meshed nylon nets (permitted by the authorities) and even by electrocution at Hydel Barrages, by placing live H.T. Wires in the water. Explosives are very cheap and available in most towns, e.g., Dehra Dun, Hardwar, Kotdwara, Ramnagar etc. Truck loads of fish are removed in this way (with many more left in the river either dead or dying or maimed) sometimes to be sold at ridiculous prices and a good quantity to rot. Where a small-meshed net (specially of nylon) is used, no fish above 1 or 1½ lbs. can escape. The use of such nets were never permitted in the past and the rules laid down that if any stretch of a river had to be leased for netting, only such nets having a particular mesh size could be permitted. I think a mesh size less than 3½" or 4" was never allowed.

I am reliably informed that these restrictions are not enforced very strictly and instead of leasing out small stretches of a river as in the past, large sections extending to 5 miles or

more (as between Rishikesh and Hardwar) are nowadays leased out and these leased sections are never under any sort of surveillance or patrolling for checking of malpractices.

This is what Mr. M.L. Mehta writes in his exceptionally fine article "Save the Mahseer" (Times of India Sunday 6th June 1976):—

"It is ironical to observe that forest guards at Satyanarayan (near Hardwar) will check the fishing permits of genuine anglers, but do not (or dare not) try to stop the destruction of fish species, on the river, despite being paid to protect the mahseer. A friend, who stayed at the forest bungalow at Satyanarayan and went to fish along the Song (river), saw several people 'bombing' the fish. He informed the forest guard and while doing so, one of the culprits arrived. He turned out to be a son of the guard himself."

He goes on to say about bombing—

"To catch the fish on the way, up go the "bombers," several men who know when the fish schools will move up—just after the monsoon sets in. The explosives can be obtained from Hardwar at Rs. 1.25 for a packet. It is a profitable business, for the mahseer are sold at Rs. 8 a kilo."

Such is the story all over our country and perhaps the only undisturbed area left is the Corbett National Park through which flows the Ramganga river. It is a famous mahseer river, but today is probably not the same and the fish are reported to be extremely shy and difficult to catch. This is very likely considering the destruction that is going on in the upper reaches (outside the Park and above DOMUNDA) and in the lower reaches (below Boxar) owing to the new barrage near Kalagarh where no outlet or FISH LADDER (as it is known) has been provided at the dam.

The absence of fish ladders on our dams and barrages, constructed during recent times, prevent the fish from its annual migration for spawning. Hence, only the fish which are above the dam can travel up, if at all they survive the bomber or poacher.

Those below, can only play out their lives without fulfilling the natural laws of procreation. Like the dam on the Ramganga, several hydel barrages, e.g., on the Jamuna and Asan rivers near Dehra Dun, have been constructed without such fish ladders and on these rivers, the normal cycle has been ended completely for the Mahseer fish.

In 1966, the Hon'ble Dr. K.L. Rao, Central Minister for Irrigation and Power, appreciating the need of providing such fish ladders was pleased to send out a circular directive No. 28 (6)/66-Policy dated 27th September, 1966, to all state governments, to incorporate "fish ladders" and (even) "fish lifts" (as provided on some exceptionally high

dams in U.S.A. and Canada) in all new dams and barrages in the interest of fish life. It seems that these directives have not been followed, at least in the U.P., because the barrages on the Asan and Jamuna rivers near Dehra Dun and on the Ramganga, near Kalagarh, which were completed much after 1966, are without any fish ladder. It is also doubtful whether any State Government has been conservation minded to think seriously on these lines because from all reports, no fish ladders have been provided anywhere in recent times. A most discouraging picture indeed.

The reader may well question if there are at all any fish ladders anywhere in India. The answer is that most of the major dams and barrages constructed prior to 1940 were provided with such outlets and two ready examples are at the Laljiwala Headworks on the Ganga at Hardwar and the Dam at Rupa (Punjab) on the Beas river.

The need for conservation has, however, been felt by the National Commission on Environmental Planning and Co-ordination who are commissioning studies on the pollution threatening the aquatic life of our major rivers like the Ganga and the Cauvery. Strange enough, the Indian Board of Wild Life are completely silent on the subject. Countries like the U.S.A., Canada, U.K., Finland, Norway and Sweden take pride in their sporting fish—the Salmon and the Sea Trout, and not only do these countries encourage the sport of angling but spend a fortune on their conservation. A good deal of foreign exchange is earned by these countries from visiting sportsmen and it is surprising that in our own country, we are blind to these avenues for augmenting our foreign exchange earnings. In fact, real preservation can only be achieved by selective killing, for sport, whether it be animals or birds or fish and to call for a total prohibition is only to invite the poacher and the law breaker (and also the hypocrite) which our country is alas, so rich in. I have mentioned the word hypocrite because while we pretend to be keeping up the good names of Lord Buddha and Lord Mahavira, we have been incapable of stopping the massacre and destruction that has been going on, all round, of our Wild Life.

As stated, preservation can be achieved not by bans or prohibition but by selective killing for sport and I am quite confident that so far as the Mahseer fish is concerned, it is possible, with a little effort to revive conditions as were prevailing 20-30 years ago. Large stretches of all major Mahseer rivers and streams should be reserved for angling on issue of permits on the spot. "Beats" and "Zones" can be marked out with Fishing Wardens and Guards posted at various places. Permits should be freely issued and sportsmen encouraged. If these are done then the genuine permit holders will soon outnumber the poacher (or the bomber) and there will be an automatic check as in the past.

Anglers in India and abroad, who have had these experiences will agree with what I say. In the words of Mr. M.L. Mehta, it is time that a "Save the Mahseer" campaign is launched and vigorously pursued.

When Back to the Wild

(Rehabilitation of Captive Reared Gharial Juveniles)

By

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Man's exploitation of nature and her creations at one time reflects in future as a burning issue requiring a very careful and well-thoughtout scientific approach to rebuild the loss. Sometimes the loss is irreparable. To-day we find great depletion in our wildlife populations because of our own mistakes in managing and exploiting them. Same has happened with the crocodilians all over the world and it has become necessary to start conservation schemes to restore wild populations by executing "grow and release" techniques.

The "grow and release" technique, pioneered by Dr. H.R. Bustard, involves, in a crocodilian conservation programme, collecting wild-laid eggs before they are preyed upon, hatching the eggs under strict supervision and rearing the hatchlings under best husbandry conditions to ultimately release them when they attain a stage when it is felt that they can well look after themselves in the wild. The Gharial Research and Conservation Unit at Tikerpada is a Government of Orissa/Government of India/Food and Agriculture Organization of the United Nations/United Nations Development Programme scheme whose purpose is to rehabilitate the gharials, *Gavialis gangeticus* (Gmelin), in Satkoshia Gorge on trans-Mahandi. This gorge is now the sanctum sanctorum of a 750 sq. km sanctuary, the Satkoshia Gorge Sanctuary, declared on the 19th May 1976.

Like any other conservation scheme it has had its difficulties and still has its problems requiring solution. The main problem to be faced in a crocodilian scheme is that we are dealing with a group which is still legendary and regarded as vermin. A solution to this is of course, through excellent public education to achieve the best public relations for crocodiles. There is much scope for this in the case of the gharial which is completely innocuous to man. There are no records of gharial attacking man or domestic animal. It is necessary to attract the minds of the local people towards the scheme and make them understand the importance of the scheme and that the scheme is to extend direct or indirect help to the local people.

The other problem with some people (not our local people) is that they, while appraising the various aspects of the scheme, often say, "Are you then going to fill our rivers and tanks with crocodiles and deprive our children and ourselves from taking bath and using the water for other purposes?!" This raises two points. Firstly, crocodiles or gharials will not be released into places where the area is disturbed by large human habitation. They will be

released into the wild where the wilderness still prevails and it is within a well protected Sanctuary or a National Park. Secondly, in places like the Satkosha Gorge, which is famous for being the largest gharial habitat, the people lead a balanced relationship with the gharial, neither interfering with each other's activity.

Another problem faced is the suspicion over the success of the conservation or the economic aspect or both. This is of course, not surprising. However, when a species is under threat of extinction one must not unduly stress the economic aspect. The first task is 'plenty through preservation'—the motto of our Society, The Wildlife Preservation Society of India.

Moreover, successful crocodilian conservation programmes could turn out to be an excellent exchange earner, if properly managed. And regarding the conservation the project (in Orissa and U.P.) is going to at least quadruple the Indian gharial population this year (1976) and at the same time doubling the world population.

The scheme at Tikerpada intends to release gharials over a metre long into the Satkosha Gorge and protect them until and after they establish themselves into a good breeding group. In most sectors a pessimism prevails as to whether the animals will confine themselves to this gorge—a fourteen mile (22.4 km) stretch of a 350 km long large river. 150 km upstream of the gorge the river is checked by the Hirakud Dam. Downstream, the river branches off and falls into the Bay of Bengal. In contradiction to the pessimistic view held by others regarding the stay of the gharials in the gorge, we firmly believe that when back to the wild, crocodilians, if given a preferable home, will not normally leave it. This belief is based on data on other parts of the world where crocodilian release has taken place, initially by Dr. Bustard and his associates and also by Mr. A. Pooley in South Africa.

The Satkosha Gorge is a narrow stretch of Mahanadi ranging between 300-700 metres in width, running between a series of hills and fanning out at either ends. During summer, at places the depth of water is over 10 metres and during monsoon it rises about 10 metres (1975 record at the Unit). Many nullahs stream into the gorge. These nullahs drain off their last drops towards end of November but during flood they form a good retreat for the gharials since these animals do not like the strong current of the main river during time of flood. There are very good nesting and numerous basking sites within the gorge area. Apart from this, the gorge had its own reputation for being an excellent fishing spot of the state. All these conditions favour a good gharial habitat. A gharial will not ordinarily get these conditions outside the gorge and hence are believed not to like the river outside the gorge and thus if at all go out at any time of the year they will come back, if there is no human harassment within the gorge. These movements have been observed by us with those gharials which are naturally occurring in the wild during the course of the first detailed movement study on the gharials.

On 20th October 1975 a 1.5 m gharial was caught in a nylon net by two fishermen from a place about 10 km outside the gorge. This is certainly one of the very last ones of a population, that once flourished in that part of the river. This gharial was kept in captivity and then released back to the wild within the gorge on 17th November 1975, at a place 15 km downstream from the place where it had been caught. Observations on its movement, when it was back in the wild, were very interesting. It stayed for about a week at the precise place of release. Due to frequent disturbance by visitors trying to closely approach it and also by the fishermen the gharial moved further and further upstream with occasional long halts at some places. Now it has returned to the same place where it was caught, a locality virtually free from human disturbance. This indicates the gharial's liking for a particular place—its 'home' provided this is free from disturbance. This area is known to biologists as the home range of the animal. It is well known that animals do not normally leave their home range. The home range is also the place where it first settled.

There is a small nullah near the place where this 1.5 m juvenile gharial lives into which, possibly, it goes during high floods. There are reports of former sightings by fishermen of hatchlings in this nullah.

From the information given above it is clear that in the absence of disturbance, particularly harassment to basking or nesting, occasioned by visitors or fishermen or both, the gharials will want to stay in the gorge.

A similar observation of the mugger crocodile liking the gorge habitat is described in the following article (Back to the wild). These muggers, when only about six month old released themselves into the wild (Satkoshia Gorge) and at present (June 1976) lead a highly successful life.

When Back to the Wild

(Rehabilitation of Captive Reared Gharial Juveniles)

By

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In August 1975 three different groups of mugger crocodiles (*Crocodylus palustris* Lesson) (five to a group) were obtained from Tamil Nadu by the courtesy of the Forest Department of Tamil Nadu and The Madras Snake Park Trust and Conservation Centre. These muggers were kept at the Gharial Research and Conservation Unit, Tikerpada beside the Satkoshia Gorge on trans-Mahanadi in three different concrete pools each $2 \times 2 \times 0.3$ m with ample vegetation inside the pool enclosure to provide a feeling of security.

On 29th October two muggers from the largest group could not be found in their pool and had escaped by breaking through a rusted portion of the wire-mesh enclosure at a height of 15 cm above the ground.

On 29th November a crocilian track (suspected to be of a mugger of about 0.5 m) and a faecal pellet were detected on a marshy/rocky area near the beginning of a long sandy stretch, 1.5 km downstream from the unit's hatchling pools. A week later both the muggers were sighted at this locality by fisherman and by our Gharial guards. Perhaps, due to disturbance by the day-and-night activities, one of them moved to the other bank of the river. The other also followed it towards mid-January. In the second week of May 1976 one of these muggers were caught in fisherman's net while prawning. It was released back into the wild by the fisherman. It is reported both by our guards and the fishermen that the two muggers now back in the wild are of similar size to our captive muggers from the same brood. Our largest mugger measured 95 cm and weighed 4 kg at one year old.

These observations throw light on the time of releasing muggers back to the wild in the "grow and release" technique of crocilian conservation. In applying the technique successfully, it is important to know the period for which the hatchlings have to be kept under captive rearing conditions in order to draw up effective management plans. This will depend on the genetic stock used since in the present (growth) study we have found noted differences in growth of populations from fairly close localities even when these are reared under identical conditions. It is most important that they should be released into the wild as soon as they are large enough to look after themselves. Our pioneering observations suggest that choosing the right variety, like those from Hogenakal of Tamil Nadu, the young muggers can be released at only six months old. Of course, the only criteria will be the size not the age. Our muggers, which are now leading a successful life in the Satkoshia Gorge, were 56.9 cm and 658 gm and 54.3 cm and 471 gm when last measured, six days before their escape.

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A Blueprint for Wildlife

ARJAN SINGH

We have reached a crucial point in what has up to now been a somewhat half-hearted, tongue in cheek effort to conserve our wildlife. To conserve it for our hunters to shoot—on a sustained yield basis. To have plenty through preservation, for our nimrods with their head in the clouds and their thoughts in the past, to satisfy their killer-ego.

That era has ended, and we are in a brief transistion period in which to decide whether we preserve our wildlife or whether we remain as the sole survivors.

We have everything in our favour. The trigger happy old soldiers of yesteryear are gradually fading away, and perhaps it is a sign of advancing civilisation, and of culture, that the present generation largely feels that we have no right to destory what we cannot create. We have a Wildlife Act which while, not being perfect, is oriented in favour of wildlife. We have realised that owing to the pressure of human population we cannot save all our wildlife everywhere. We have rationalised a concept, and therefore from now on instead of a series of compromises leading to a last bastion and beyond, it is possible to stand firm on the sacrosanctity of our Parks and Sanctuaries. After that it is for our planners to decide whether we borrow a few more years at the expense of the pitiful remnanat of our wildlife's habitat before our galloping population continues its interrupted Gadarene rush.

Another essential point of acceptance is that the Forest Department is not qualified by training, by instinct, or by competence to look after wildlife. In the days before wildlife was accepted as a subject of departmental management, an employee of the Department was trained as a forester, and his salary and promotion depended on how well and scientifically he managed the forests under his charge. Wildlife was a relaxation. After the serious business of tree care, he went and studied game animals over the sights of a rifle, and with his family and his friends he shot for the trophy, for the pot, and for entertainment. But when Wildlife came on to the list of managed subjects—Hey Presto—he was ipso facto the expert by association.

Wildlife is now just as much a scientific subject as forestry, and to expect a person trained as a forester to run wildlife as a concurrent subject without bias or prejudice; especially in view of the political motivations and pressures, is virtually impossible. Tree culture and wildlife park management are diametrically opposed subjects and must be run by separate departments. Commercial felling on a rotationally controlled basis is a means by which the surplus timber of a forest is marketed, making way for the better growth of the remaining trees. Scientific Park Management envisages preservation of the biosphere,

where the mere sight of a good herd of chital or swampdeer does not mean much more than good protection for game animals. The cutting of a mature or over mature tree means the possible destruction of birds nests, the killing of hibernating snakes, of monitor lizards, of geckos and many other forms of reptilian and parasitic life which find shelter in these trees and are destroyed once they have been commercially felled. The Park looks to a pristine forest untrammelled by hand of man. A scientifically managed forest is entirely for human use. It seems quite fantastic in the light of modern thought to imagine that wildlife and forestry could ever be anything else but at loggerheads. The United States of America which has possibly the best run Parks system in the world, has their separate Wildlife and Fishery Department. East Africa though not nearly so timber oriented as we are, have their Game Department.

The only condition under which wildlife could possibly work with forestry is during fellings for the improvement of habitat. This operation would possibly take the form of opening up the canopy to encourage grass growth for grazing ungulates and trunk coppicing for the browsers, but in no case would this be a commercial operation, and the fallen timber would be left as breeding and retirement dens for forest vertebrates. A clean forest floor for humans is not necessarily so for animals, and National Parks and Sanctuaries are meant for its wildlife. In any case our overexploited and degraded forests will not require ritual thinning for some considerable time to come. This classical variance of scientific forestry vis-a-vis scientific wildlife management makes it obvious that one department cannot run these warring facilities.

It is obvious that placing of forestry and wildlife in the charge of one department was a thoughtless act of least resistance. Because the Forest Department already ran the forests, it was wrongfully argued that the creation of another department would cause friction and non-co-operation in their working. The reasoning could not have been more spacious, for in the concrete jungles of the cities, many departments function, and though plagued by inter-departmental noncooperation and jealousies and hag ridden by the Finance Department, Government does seem to get along; whereas the wildlife organisation has such a menial setting in the scheme of affairs that not only is it sought to post supernumerary officers to the cadre but they are given no fixity of tenure, and with no chances of promotion they hanker after a return to the parent wing. Therefore the cliché that but for the Forest Department there would be no wildlife left is a false one, and it is truer to say that it is surprising there is any wildlife left in spite of the Forest Department. Maldhan and Jualasal declared as swampdeer sanctuaries in 1954 have no swampdeer now. Dudhwa declared a Sanctuary in 1968 has Indo-Nepal's largest population. Let the Forest Department answer that one.

Local objections to having commercial operations within a wildlife area are even more severe. Fire is the single all pervading hazard which degrades and destroys forests and wildlife habitats. It is the monopoly of no one, yet is a potential menace in the hands of every intruder into the forest, and once well and truly alight is virtually uncontrollable. Forest contractors use it as a means of covering up their illicit fellings. Low echelon forest staff may use it for the same reason. Graziers use it for new shoots of grass. Forest concessionists use it as a means for ensuring that there is plenty of deadwood available for the following season. Honey collectors use it to smoke out hives, and anyone with access to the forest can leave a smouldering fire or throw away a burning cigarette. These fires in April and May are devastating engines of destruction.

It might now be worthwhile citing a few examples to illustrate the cavalier treatment which has been meted out to the nascent wildlife organisation, and which will continue until the Wildlife wing has a built in power structure and a dignity of its own. In 1974 five Forest Department employees were caught inside a sanctuary with a swampdeer loaded on a Government tractor with a 12 gauge gun and a searchlight, also government property. No departmental action was taken against the culprits. On the contrary, two Conservators of Forest recommended that I should be departmentally prosecuted for falsely implicating Government employees and beating them so that they sustained severe internal injuries. Moreover, the fact that an officer was deputed by the Central Government to enquire into the case was strongly resented. In 1975 a tiger cub was shot by a Range Officer acting under the orders of a Divisional Forest Officer. Moreover the carcass was forcibly removed from the custody of the Wildlife Guards by two Range Officers and their assistants. No departmental action was contemplated, but on Central Government instance an adverse entry was given to the Divisional Forest Officer. For some reason the Wildlife Warden was also given an adverse entry by the pundits of the Forest Department. In 1976 the Dudhwa Sanctuary was declared a National Park. The Forest Department tried their utmost to resume commercial operations in all but a core area, in spite of the contrary being laid down in the Wildlife Act of 1972. The Wildlife Warden was also transferred to the Forest Corporation in spite of his having expressed a desire to remain with the Wildlife Organisation. Ideally Wildlife Management should not consider having any commercial affiliations, but in a developing economy ideals often go by the board, and the shortage of funds in a non-revenue earning department means that development programmes are bound to be hampered vis-a-vis human needs. Therefore the only way that wildlife can become commercially oriented is through Tourism, and the only department with whom it can have a rewarding affiliation is the Tourist Department. Some time ago the Central Government proposed the setting up of a separate Wildlife Wing in the States under the Chief Conservator of Forests. This would have ensured continuity of tenure, of interest and the chances of promotion in the service of an officer's choice. In spite of the fact that my

proposal had been for a separate Wildlife Service, I was willing to go along with this procedure, but the States took no action. I now feel that with a forester as a departmental head there will always exist a bias in favour of forestry, and therefore if the Wildlife Organisation has to be placed under any department it should be delinked from the Forest and put with the Department of Tourism. With Wildlife and Forests coming on to the Concurrent List of Subjects this has now become possible.

Another unfortunate feature of Wildlife preservation is that in these days of fierce nationalism, wildlife should be an international concern and its protection should be the responsibility of all nations. The affluent nations who have killed off much of their wildlife, and now wish to save it in another country, should be allowed to do so. If they wish to save the tiger they should be prepared to pay for that privilege. It is not fair of us to expect the cultivator who tills a piece of marginal land at the edge of the forest and whose bullock is killed by a tiger, to be eloquent about saving it when he has to go to the money lender to borrow to buy another bullock, at exorbitant rates of interest having mortgaged his land, or see his small plot go out of cultivation. It is not enough for cheer leaders in distant lands to utter rousing slogans about saving animals for posterity. The cultivator just does not see it that way being too engrossed in the problems of his own generation. It is for these affluent nations to pay for the cultivators loss. However I am convinced that they would be prepared to do so, but forces of nationalism to which I referred earlier, who see C.I.A. agents behind every bush and forces of political subversion in every foreign face, would not tolerate this. There must therefore be an international agency who would co-ordinate the efforts of the prosperous nations who wish to pay for the "luxury" of keeping wildlife alive. We have the F.A.O. who comes to the aid of human sufferers, why do we not enlist the aid of the UNDP to help in developing our Parks and Sanctuaries? They are willing to do so, but their charter lays down that they must be invited by the host country. Time is not on our side, and tomorrow may be too late.

The disparity between human and animal populations is so great, and the power to survive is so overwhelmingly superior in the human race, that we must accept the truism that National Parks and Sanctuaries can only really develop their maximum utility with the co-operation of their peripheral human inhabitants. Cultivation has extended to the forest boundary, and there is no buffer zone to absorb the shocks of human intrusion. These humans have depended from time immemorial on the forest for their necessities of life. Grass for thatching of their roofs, timber for construction of their huts, fuel wood for burning in their homes. These privileges are now being denied to them by the Wildlife Act of 1972 which decrees that henceforth they are trespassers inside the National Park, and they are immediately hostile. There are only two solutions. One is the familiar bugaboo of compromise, which in the case of a burgeoning population cannot even be considered. The solution remaining is that they should cease to be dependent on the forest for material for their living accommodation and their cooking. This would mean the construction of semi-

permanent living quarters and scientific cooking arrangements like the Gobar Gas plants, or solar heaters. The expenditure will be great, but with the co-operation of international funding this will not upset the national economy. Once the feeling of innate hostility has disappeared, a modified and wildlife oriented tourism can benefit the economy of the neighbouring villages and townships. Wildlife farms can provide employment for many inhabitants, and many occupations based on wildlife management will spring up, for once human ingenuity is harnessed to human desire much can be accomplished, as wildlife will then mean something to the people.

The woodsman does not hate the tiger. He is in awe because of its majesty and supernatural powers. He dreads him because of his power to harm, but he has the fierce pride of possession, and once he feels that the deer and the tiger are no more a menace we will be able to say that we have saved wildlife in one small corner of this country, for the tiger is the touchstone of the ecological health of the forest.

A beginning in international co-operation has been made when Prof. Grzimek, the eminent German conservationist and wildlife television film producer, has presented a female tiger cub to the Prime Minister with the hope that an effort be made to return it to the wild, and thereby provide an example of the possibility should a depleted population need to be reinforced in the future. She now lives in amity at Tigerhaven with a leopard and a small dog. The ball is in the court of homo sapiens.

Research Fellowships In Wildlife

Applications are invited by the President, Forest Research Institute and Colleges, Dehra Dun for the award of 10 Senior Fellowships and 10 Junior Fellowships to carry out research in this Institute or in any other Institute/University, in animal biology, ecology, breeding in captivity, status survey, census and populations dynamics of Wild animals—mammals, reptiles, birds, fisheries, and fresh water, biology.

Qualifications : (For Senior Fellowship) : Ph.D. or D.Sc. Degree or its equivalent; Value of Scholarship: Rs. 600/- per month.

Qualifications : (For Junior Fellowship): M.Sc. degree or its equivalent. Value of Scholarship : Rs. 400/- per month. The duration of the Fellowships will be upto 28.3.1979.

Age : No bar. Applications should reach the President, Forest Research Institute and Colleges, Dehra Dun by 15.2.1977 on the prescribed form which along with the Rules for Scholarships can be had from him on payment of Re. 1/- through a crossed Postal Order.

Play Instinct in Animals and Humans

BY

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The instinct to play is present in all of us. The studies done on animals have further shown that man shares this instinct with them—a fact underlying nature's serious purpose in bestowing different species of animals with it commonly. What is more, its universal occurrence and the vital role it seems to be playing in individual growth and maintenance of social groups suggests play is a basic instinct like those of feeding, fighting and mating.

All basic instincts have the same goal: survival. They achieve it by impelling us to perform appropriate behaviour patterns specific to them. When used rightly, the instincts operate as in-built success mechanisms that guarantee our successful survival.

Play instinct makes us exploit opportunities in a great many ways and thereby develop our abilities to tackle real life problems with right competence. Under the influence of play our mental processes become sharp and swift. Through play we develop our skills and language much faster than what classroom teaching can ever accomplish.

Nature is a salesman par excellence. It has completely sold us to its scheme of instincts by offering a single but tempting bonus gift: pleasure. Eating is a pleasing sensation but pleasure is only incidental to the real object which is evidently to provide health and strength. Mating and all that precedes the act proper is no doubt one of the irresistible pleasures life on earth provides but the aim is not pleasure, but reproduction. Fighting, be it real or symbolic as in sport, is intensely absorbing and highly rewarding in terms of pleasure, for the victor at least, but the goal of aggression is not pleasure but survival. So with play.

Joy derived from play is a mere icing over the cake of real benefits accruing from the successful performance of behaviour patterns designed by the play-producing instinct. The real gains obtained from play are: for youngsters, development of muscles and reflexes and practice for situations that will arise in adulthood; and for young and old alike, creativity and mental sanity by providing effective outlets for the surplus nervous energies generated either constitutionally or through frustration arising from thwarted desires.

All mammals have a strong exploratory urge, but it is keener in the younger members and fades with advancing age with a single exception in case of humans in whom the urge generally grows with the growing age though with advancing age play forms change greatly and rules for games played become elaborate and complex. This differential rates of growth in the exploratory urge is also one of the basic difference between man and other animals

But this difference apart, the play forms indulged in by the young animals and young children are strikingly similar in functions they serve and the rules they follow.

Take for instance, the case of baboon monkeys who live in troops and are found in the jungles of East Africa. The youngsters in a troop range in age from newborn to subadult and love to play with each other despite age differences not unlike our own children. Play also develops a sort of discipline by developing inhibitions which prevents any serious hurting of younger members by the larger subadults. If the older one is not cautious it may hurt the younger one but in that event he would miss any future chances of playing with the latter. Thus the urge to play brings about a sense of responsibility in maintaining good social relations in the group.

Young baboons may play together or on their own, as the situation may enable. When they play together, they run, chase and wrestle with plenty of noise thrown together. These activities develop muscles and reflexes and the animals can practise sort of growing-up. In the process they also learn about each others' relative strength. Children play many forms of duelling, exerting, chasing, catching, hunting and daring games, with different names in different countries or even in the same country in different places but with surprisingly similar set of rules. They derive the same kinds of benefits the young animals obtain from their games.

If we see a young baboon playing all by himself, we shall find it doing not so very differently from the play of children. A lonely young baboon will invent a game with whatever material he can lay his hands or feet on in close proximity. Sometimes children may wander a little distance but the baboon will not leave the troop's neighbourhood. The young animal will pick up a stick or stone, for example, and then spend time in closely examining and handling it.

A young child is doing precisely the same way when alone; it would pick up anything nearby that has caught its fancy for the moment, examine it, probe it and if possible tear it open to explore the inside. We see kitten and puppies doing these antics much to the delight of the children and chagrin of their mothers. Anything new is grist to the child's mill of play, but the newer the thing, the greater is its play-appeal.

Well-to-do parents think they are increasing their child's play-satisfaction when they bring expensive toys and mechanical gadgets, but this is hardly ever true; the novelty of the toys soon wear off and the child continues to play with worthless material as before. As Dr. D.W. Winnicott, a one-time President of the British Psycho-Analytical Society, wrote in his book *The Child, the Family, and the Outside World*, it seems better to provide too little rather than too much of materials and ideas for play, since children are able to find objects and invent games very easily. What is more significant, they enjoy doing so.

I have a son who is a little over two and a half years old. He loved to play with his old tricycle which was badly battered earlier by his two elder sisters when the vehicle was theirs. The youngster was first put off on finding out the handle coming loose every so often. Undaunted, he soon invented four games with the tricycle in place of only one before: dismantling, assembling, and overturning it and turning the wheels of the upturned rear wheels. His inventiveness was finally checked by his mother who, angered by the injury the little imp inflicted on his most private part while trying to ride the handleless tricycle, threw the hardware in the unused store-room of the house. But the fellow still managed to come out of the scrape with one more game. For the next two-three days he kept exhibiting the injured anatomy to all those who came to our house, ladies included.

Like young baboons and children, young chimpanzees also spend a great deal of time playing. Young chimps often play by themselves if companions are not available, swinging about in a tree, jumping over branches, somersaulting or gambolling on the ground. But they like to play with each other if playmates are available, chasing round and round a tree-trunk, leaping through the tree-tops, dangling off by one hand while hitting with the free hand the other dangling playmates, wrestling on the ground even as they bite, hit, or tickle each other much in the manner of the baboons.

Chasing games, which include the variants of the all too familiar hide-and-seek: young children play, appear to be the most commonly played ones by most mammals so far studied. Squirrels for example, when they are two, will dodge each other round the base of a tree while playing in exactly the same way that young children do. The immense popularity of chasing games among children, aged about 6-12, was borne out by an extensive survey carried out in the 1960s in England, Scotland, and a part of Wales.

Based on information from more than 10,000 children attending local-authority schools in the beforementioned provinces, two workers, Iona and Peter Opie, compiled a report on the children's games in street and playground. One of the most extensive surveys ever carried out in the field of play and games, it covered all kinds of games played by children. The report lists over 140 games of which 80 or about little more than a half are of chasing variety, while duelling or wrestling variety covers only a half this number. The games involving brain-work, namely the guessing, acting and pretending games, ranked last in the scale of popularity covering only 20 per cent of the total games listed.

As children love to play with youngsters of another species, for example, kitten and puppies, so also animals themselves appear to be adopting young animals of other species as their playmates. Jane Goodall studied chimpanzees in the Gombe National Park of Tanzania for full 10 years. She observed that it was common for young chimpanzees and young baboons to play together though the games usually consisted of wild chasing around,

either on ground or through the trees, or sparring when each hit out quickly towards the other and then drew away.

She also noted a strange friendship that arose between two young females of the two species which lasted for a year. The baboon is much smaller when adult as compared to the full-grown chimpanzee. Both the females were of the same age. They would play, wrestle and pat at each other. Once the frolicking baboon went around behind the chimp and, reaching forward, tickled her in the ribs. The chimp broke into a wide smile, and pushed at her playmate's hands.

The playful dolphins make endearing pets. In the last thirty years they have been kept in large seaquaria in the United States. They are very playful and skilfully learn games from their attendants such as retrieving beach-balls or old tyres. They often, surprisingly, initiate games with their attendants. They not only play with each other for the fun of it but would not hesitate to tease the sharks and turtles kept in the same reservoir.

The young animals and children both alike engage in play following the same set of principles. There are certain conditions which promote play, others that restrain it.

A field released from tension is a *sine qua non* for all play behaviour as for curiosity. When anxiety is great, play becomes impossible. But at the same time it is a fact that while children may be playing for pleasure, they also play to master anxiety. Knowledge of this fact may perhaps make parents and other adults more sympathetic and understanding towards the children dependent on them.

Anxiety is often a major factor in child's play. If the child feels threatened by excess of anxiety, he would be led to compulsive or repetitive play, or to an exaggerated seeking for the pleasures that belong to play. If the anxiety becomes too great for the child, it would be impossible for him to play and would be led into pure exploitation of sensual pleasures. Play should therefore be encouraged so that the child is able to master his anxieties as and when they arise.

Any effort to restrain play would cause a corresponding increase in the child's store of anxiety. If unchecked, such increase could be disastrous for the unfortunate child's developing personality. The child not only works out his anxiety in play, but he also gains experience from it. Personalities of children develop through their play-experience in the same way as adults develop theirs through their experience in living.

Play is a big part of a child's life. He makes friends and enemies during play; making friends apart from play is not easy for him. Play is an important factor in bringing about general integration of his personality. The child who cannot play, or cannot play in generally recognized ways, is suffering from a split personality.

Such split personality which makes childhood play impossible results from sheltering the child from social contact as a member of juvenile play-group to which a normally raised child would naturally graduate as he overgrows the phase of infant's social play that is directed primarily at the parents. Such a sheltered child will always find himself badly handicapped in his adult social dealings. Revealing information in this respect has been obtained from experiments carried out on monkeys.

Monkeys that were reared in isolation from other youngsters thus denying them all opportunities of play and consequent socializing, failed to participate in play-group activities to which they were exposed on their becoming elder juveniles. They meekly avoided all play and shunned any contact with the members of the group.

When these initially isolated monkeys matured, they showed no interest in sexual partners, though physically they were healthy. Forcible mating of isolate females did bring about normal birth of offsprings, but after that the mothers lost all interest in them and either killed them or ignored them.

Experiments with chimpanzees, which are the nearest to human species biologically, conducted on similar lines gave comparable results.

The situation would not be different for the young of our own species. If the child is not encouraged to be more outward-going, to participate in social contacts with other juveniles as a member of their play-groups, it will be in serious trouble in latter life. It will find making new adult contacts, much less friends, very difficult and will tend to cling desperately to the old companions.

American psychologist O.H. Mowrer holds that neurosis is practically synonymous with personal immaturity. And he further traces this immaturity to incomplete socialization of child brought about by a failure in family situation. That would be one way of telling the importance of play in preventing nervous breakdown.

We, young and old alike, and young animals choose those forms of play most where probability of obtaining disproportionately large results from the expenditure of comparatively little energy is maximum. Both chimps and children like to bang those objects which produce the largest noise with least effort; easily moving toys, largest but light balloons, sand and mud that can be moulded easily, large scribbles on paper or wall produced by lightly moving pencils or crayons are other popular play forms having maximum appeal.

Adults invest in lotteries, stake on horses, gamble on cards or dices lured by the same minimum effort-maximum reward principle which guides children in their play.

Playing is essentially creative. All scientific knowledge, says the nobel-laureate Konrad Lorenz, arose from the playful activities conducted in a free field entirely for their own sake. It was a playful exploratory urge which made another nobel-laureate C.V. Raman find out why the sky was blue. That same urge prompted Benjamin Franklin to discover electricity, and Hertz properties of electro-magnetic waves that made development of radio possible.

Play is possible in all activities we may decide to undertake or compelled to do. It is an attitude with which we approach the work. As Dr. Hans Selye, the internationally acknowledged authority on stress physiology has defined: play is what we like to do, work is what we have to do. And he really knows for, though nearing three score and ten, he enjoys working fourteen hours a day.

Wildlife in Nagaland and Manipur*

By

S.R. BANNERJEE

Introduction Nagaland and Manipur are two small states of India. Nagaland is mainly hilly with a very small stretch of plain areas. Nagaland is bordered by Manipur, Burma and Assam whereas Manipur is bordered by Nagaland, Mizoram and Burma.

Climatic Conditions There is very little difference in the climatic conditions of both these States. There are mainly two seasons in the year, the dry and the wet. Winter rain starts in December and continues upto the middle of February. The monsoon starts from May and continues up to September. March and November are the dry months. However, with the numerous springs emerging out, these areas remain slushy at places, even during the dry season.

Winter is cold but pleasant. The winter wind blowing during December, January and February is very cold and blows generally from South East to North West.

Vegetation The entire area is covered by dense jungle with very thick undergrowth. The cultivation in this area is generally carried out either by 'jhum' method (an ancient method of burning the jungles and then cultivating) or on terraced fields.

The villages are either on the hill tops or on the river banks. Very few metalled roads exist. The foot tracks connecting the villages are generally not good and the wet season makes it difficult to walk on them.

Wildlife The thick jungles on the mountains harbour the wildlife of the region. Practically nothing has been done to protect the rich fauna which probably existed in abundance once upon a time. With the increase in slaughter of wild animals, the species which were once very common in these areas are virtually on their way of being wiped out. No forest department is functional at present.

Of the cat families, a negligible number of tigers are still found in Nagaland and the North and East districts of Manipur. Leopards, though very few in number, are still seen occasionally. Leopard cats appear to be still common. Golden cats have also been reported.

Among the deer, the barking deer is seen very frequently. Sambar is also seen in these areas.

Among the bears only one species is found, i.e., the Himalayan black bear. An occasional infiltration by the Malayan bears into these areas also occurs.

*Only the hilly region of Manipur bordering Nagaland has been dealt with.

Among the primates, the rhesus and bonnet macaques, hoolocks and common langurs are found. With the fondness for monkey meat by the Nagas, the macaques and langurs have taken refuge in the dense jungles and are not seen in the populated areas as they are seen in other parts of India.

The other animals found are jackals, pangolins, small Indian mongoose, Himalayan and common palm civets and elephants. Elephants are found on the plains and semi hilly areas bordering Nagaland with Assam.

Bird life also has diminished during recent years. Their decrease in number is also generally attributed to the large scale destruction by the local tribes.

Swallows and Swifts are very common. The other common birds are white wagtails, shrikes, Bulbuls, redstarts, scarlet minivets, ioras, tailor birds, magpie robins, blue rock thrushes, grey tits, golden orioles, black drongos, green be eaters, blue birds, collared bushchats, pied bushchats and jungle crows.

Causes The causes for deterioration of wildlife in Nagaland and Manipur can be attributed to as follows:—

- (a) Every animal is considered by the local tribes as something to be eaten and not something which can be loved or enjoyed by merely watching.
- (b) Due to the unlawful activities of the Naga hostiles, enforcement of any forest act has not been possible by any competent authority.
- (c) After the second world war, a lot of arms and ammunition came in the hands of the common man. Shooting wild animals was more easy than killing them with spears or bows and arrows.
- (d) Due to the hostile activities, a large body of troops both Military and paramilitary was inducted. As a result, a mass scale slaughter of wild animals had taken place by the troops who were well equipped.
- (e) Nagas still follow the ancient methods of cultivation. Rice forms a part of their principle diet. Very little vegetables are grown. The tribals do not drink milk and hence they have to depend on meat. At the same time the tribals eat any animal.

Recommendations: It is true that Nagaland and Manipur were under the grip of lawlessness and chaos due to the unlawful activities of the underground Nagas. Hence, no attention could be paid to its flora and fauna. But with peace setting in both these states. They are on their way to development. Hence, this is the time when some efforts should be made to save the fauna which is struggling for its survival. Certain steps which should be taken to save the fauna are as follows:—

- (a) The terrain and jungles of these two States provide excellent places for sanctuaries. Certain portions of the jungles should be declared as sanctuaries prohibiting any shooting or killing of wild animals.
- (b) A great deal of propaganda should be made to educate the masses on the importance of saving wildlife.
- (c) Wild Life education should be started in all schools and colleges.
- (d) Nature trips in the form of picnics should be conducted by the schools and the youth clubs of the villages.

Conclusion. Something must be done immediately to save the fauna of Nagaland and Manipur. A wildlife department has been instituted in Nagaland. But it has so far proved to be ineffective. After all, what will be the use of the beautiful mountains and jungles without their fauna. If right steps are not taken immediately, Nagaland and Manipur will be left with only flora but no fauna.

Going with the Wind

From Meghalaya

I write this on behalf of the wildlife enthusiasts of Meghalaya and Assam. The eastern edge of Meghalaya is bordered by one Kupli River, the other side of which begins the State of Assam in the North Cachar Hills District. On either side of this river are beautiful forests which form the habitat of elephants, gaur, tiger, leopard, sambhar etc. Among the rarer species of wildlife are the Malay Sun Bear, Hoolock and the now very rare para, or hog deer. The rare Clouded Leopard and Golden Cat may very well occur too, though being nocturnal, are not frequently seen. What other rare species may occur, I do not know as yet. This suspicion of mine is based on the fact that there seems to be something attractive about the soil in the area.

Not being a zoologist, I am not able to say exactly what it is but there are for instance very few if any, leeches in the area—something very uncommon in the North Eastern Region.

The fish in the Kupli River have not suffered too much from the effects of blasting and poisoning, so that further up the river at Panimur, there is excellent fishing. There is also a beautiful waterfall on this river.

In this magnificent refuge of nature, a hydel project is due to come up within the near future. When major blasting for the dam starts, the fish will disappear, and while construction is going on, most, if not all the wildlife will disappear—not to speak of the beautiful forests which will be ruined.

Many of us know that it takes only a few days to cut down a patch of trees and build a house to live in. How many of you know that it has taken between sixty to a hundred years for those same trees to reach maturity.

We are accustomed to living in a house, a home. If that home is destroyed will we not perish? If the home of wildlife is destroyed will not wildlife also perish?

How many of us, my friends, are aware of this astonishing fact? That Nature requires between 500 to 1000 years to develop a few inches of top soil; that by denuding a forest area that valuable top soil which has taken so very long to develop is lost for ever in one monsoon. (There of is a denuded area developed or a forest area developed?)

River beds are usually 'U' shaped for the purpose of carrying away excess water. Now when a forest area is denuded this top soil which is eroded begins to fill up and the water has nowhere to flow so it spills over the sides causing floods and degradation to human life and property, crops, animals etc.

Everyone talks of wildlife conservation and nature preservation. Are we to simply sit back and allow this massive destruction of nature to take place.

Therefore, the big question is, should this material gain of electricity take predominance over the ecological balance on which we depend for life itself.

As a suggestion, if there is a desperate need for the electricity, the same project may be constructed in some other area which is already denuded. Alternatively, coal being available in Assam, a thermal power station may be installed.

Anonymous.

रसिल वाईपर

लेखक

हरी प्रकाश अग्रवाल, भारतीय प्राणि सर्वेक्षण विभाग, १५४४-ए, नैपियर टाऊन, जवलपुर

यह सर्वविदित है कि रेंगने वाले जन्तुओं में बहुत अधिक विविधता पाई जाती है, जिसमें विविध प्रकार के जन्तुओं का समावेश है। सर्पों का वर्ग उनमें से एक है। सर्पों का वर्ग जिसे सरपेन्टिस या औफीडिया भी कहते हैं, स्क्वेमेटा खण्ड के अन्तर्गत स्थान रखता है। विभिन्न कुलों के अन्तर्गत सर्पों की दो हजार से भी अधिक जातियाँ उपलब्ध हैं। सर्प सम्पूर्ण भारत में बहुतायत में मिलते हैं, परन्तु उनमें अधिकतम विषैले नहीं होते। ये चतुर या बुद्धिमान जन्तु नहीं होते हैं तथा इनमें क्रोध करने की भी शक्ति नहीं होती। ये अपनी सुरक्षा अवश्य करना चाहते हैं परन्तु मनुष्य से डरते हैं। सर्प मनुष्य का पीछा नहीं करते जैसे कि जंगली हाथी करता है।

विषैले सर्पों में रसिल वाईपर (वाईपेरा रसेलाई) का बहुत ही महत्वपूर्ण स्थान है। यह जाति वाईपेराईडी कुल के अन्तर्गत है। रसिल वाईपर लगभग सभी स्थानों पर मिलता है, परन्तु खुले मैदानों में बहुतायत से मिलते हैं। सर्प की यह जाति सम्पूर्ण भारत, सीलोन, सिन्ध एवं बलूचिस्तान में पाई जाती है; बर्मा, स्याम व इण्डोचीन के पूर्वी हिमालय में भी यह उपलब्ध होता है। हिमाचल प्रदेश में इस जाति को सोलन से प्राप्त किया गया। इसे चीन के क्वांगटुंग भाग व फारमूसा से भी प्राप्त किया गया है। इसका वितरण बहुत अनिश्चित सा है क्योंकि यह जाति कुछ जिलों में तो मिलती है जबकि अन्य दूसरे जिलों में कम या बिल्कुल नहीं मिलती। बाल के अनुसार यह पंजाब, बम्बई, ट्रावनकोर, सीलोन, पूर्वी बंगाल, बर्मा व रंगून में आमतौर से मिलती है जबकि मैसूर, उत्तर प्रदेश, पश्चिमी बंगाल में लगभग अनुपस्थिति रहती है। पूर्वी हिमालय भाग में यह जाति दार्जिलिंग व भूटान से उपलब्ध होती है, परन्तु आसाम से उपलब्ध नहीं होती। इसी प्रकार यह स्याम प्रायद्वीप एवं मलय प्रायद्वीप में अनुपस्थिति है, परन्तु इण्डो-आस्ट्रेलिया द्वीप समूह में पायी जाती है। इसे जावा, कोमोडो तथा ऐन्डेह टापुओं से भी प्राप्त किया गया है।

रसिल वाईपर का पृष्ठ भाग हल्का पीला—कथई से रंग का रहता है, परन्तु इस रंग का अंतर देश के विभिन्न भागों में पृथक-पृथक हो सकता है। यह देखने में सेन्ड बोआ तथा अजगर के समान लगता है परन्तु इसे इसकी पृष्ठ सतह पर स्थित तीन लम्बी गोल धब्बों की कतार द्वारा सरलता से पहचाना जा सकता है। ये धब्बे आमतौर से मध्य में कथई, किनारों पर काले और श्वेत होते हैं। इनकी मध्य कतार सम्प्रवाही हो सकती है व बाहर की अन्य दो कतारों के धब्बे निचले भाग से टूट जाते हैं। निचला भाग पीला-श्वेत सा रहता है। सिर पर गहरे कथई रंग के निशान रहते हैं और दो हल्की रेखाएँ होती हैं जोकि आपस में धूथन के सिरों पर मिलती है तथा पीछे की ओर जबड़े के कोण तक पहुंचने के लिये फैल जाती हैं।

धूथन कठित होता है। जितना अंतर मुँह से नेत्र तक की दूरी का होता है, उससे कम व्यास आँख का होता है। नधुने काफी बड़े होते हैं। सिर के स्केल छोटे, कोरछादी व बहुत नुकीले होते हैं। २, ३ स्केलों की कतार

यूथन के सिरे के पार होती है; ६ से ८ तक सुप्राआकुलरों के मध्य में; २ स्केल नथुने व नेत्र के बीच में, १० से १५ तक छोटे स्केल नेत्र के चारों ओर होते हैं। शंखास्थि स्केल छोटे होते हैं, जिसमें सबसे निचली कतार के स्केल बड़े व चिकने होते हैं तथा ऊपर की कतार बहुत नुकीली होती है। १० से १२ तक सुप्रालेबियल होते हैं जिनमें से चौथा व पाँचवा सबसे बड़ा होता है; छोटे स्केलों की ३, ४ कतारें इनके व नेत्र के बीच में रहती हैं। हेमीपेनिस १०वीं पुच्छीय पट्टी तक रहता है तथा दूसरी व तीसरी पुच्छीय पट्टी के सामने विभक्त हो जाता है।

रसिल वाईपर के विष-दन्त की लम्बाई लगभग १.३ सेन्टीमीटर होती है तथा वे लम्बे, तेज व मुड़े हुये होते हैं। मेगजिलरी अस्थि जिससे विष-दन्त जुड़े रहते हैं सरलता से घूम सकती है, इस प्रकार यह सर्प अपने विष-दन्त को मुँह के तलने में मोड़ कर रख सकता है तथा जब यह सर्प काटता है तो विष-दन्त स्प्रिंग के चाकू की भाँति बाहर आ जाता है। इसका विष रक्त के लिए विषैला होता है एवं कोबरा के विष की अपेक्षा केवल एक तिहाई विषैला होता है, परन्तु रसिल वाईपर में विष-ग्रन्थियों व विष-दन्त का बड़ा आकार होने के कारण काटने से अधिक कष्ट होता है। वास्तव में विष-ग्रन्थि परिवर्तित लार-ग्रन्थि होती है जिसमें सतत विष बनता रहता है, जिसके कारण यदि सर्प लगातार काटता भी रहे फिर भी समाप्त नहीं होता है। विष-दन्त खोखले दाँत होते हैं तथा ग्रन्थि के माँसपेशियों के संकुचन से विष बाहर निकलता है।

यह दिन के समय अधिक गतिशील नहीं रहते तथा शान्त रहते हैं; रात्रि के समय इसकी मनोदशा या चित्तवृत्ति बिल्कुल भिन्न या विपरीत होती है। सायंकाल व अंधेरे में ये इधर-उधर मंदगति से घूमते हैं तथा अपने भोजन की खोज करते हैं। इनका मुख्य भोजन छोटे स्तनधारी जन्तु हैं, परन्तु मेंढक, छिपकली तथा पक्षी का भी भक्षण करता है। यह अपनी भावुक जिह्वा व नथनों द्वारा चूहों की उपस्थिति का सरलता से पता लगा लेते हैं।

रसिल वाईपर तीव्रता से आक्रमण नहीं करता परन्तु जब बहुत उत्तेजित या क्रुद्ध होता है तो शत्रु पर पूरी शक्ति से तुरन्त वार करता है। यह बहुत ही तीव्र स्वर से फुंकारता है व इसकी फुंकार की ध्वनि को सरलता से भुलाया नहीं जा सकता है। इनमें मैथुन क्रिया जनवरी-फरवरी माह में होती है एवं जून-जुलाई मास में इसके बच्चे उत्पन्न होते हैं। बहुत से प्रमाण ऐसे भी मिलते हैं जिनसे ज्ञात होता है कि यह अंडे भी देता है। इसमें गर्भावस्था काल ६ माह होता है। एक समय में २० से लेकर ६३ तक बच्चे उत्पन्न होते हैं। नवजात रसिल वाईपर की लम्बाई ८ इंच से लेकर ११ इंच तक होती है।

रसिल वाईपर का विष हल्के पीले से रंग का द्रव्य पदार्थ होता है, जिसमें ८०% जल होता है शेष २०% प्रोटीन, ऐनजाइम व अकार्बनिक लवण होते हैं। इसके विष की १५ मिलीग्राम मात्रा मनुष्य के लिये घातक होती है तथा १० सीठी प्रति दश विष के द्वारा ६ मिलीग्राम विष निष्प्रभावित होता है।

जैसा कि ज्ञात है कि रसिल वाईपर के विष का प्रभाव रक्त पर पड़ने के फलस्वरूप रक्त जमाव व कोशिकाओं का नष्ट होना आरम्भ हो जाता है। इसके काटने से मनुष्य में निम्नलिखित मुख्य लक्षण दृष्टिगोचर होते हैं :—

- १) तुरन्त व लंगातार जलन व पीड़ा होना
- २) सूजन
- ३) काटे हुये अंग का रगहीन होना तथा चोट लगने के समान घब्बे व निशान पड़ना
- ४) जी मिचलाना
- ५) थूक, मल, मूत्र में रक्त का आना
- ६) द्रष्टि व श्वास लेने में कष्ट होना।

रसिल वाईपर द्वारा काटे हुये व्यक्ति के जीवन की रक्षा केवल प्रतिदंशविष द्वारा ही की जा सकती है। यह प्रतिदंशविष सीरम सर्प के विष से घोड़े के प्रतिरक्षा करने के द्वारा बनता है। ऐसा करने के लिये घोड़े में थोड़ा थोड़ा करके विष प्रविष्ट किया जाता है और एक माह तक शनैः शनैः इसकी मात्रा अधिक की जाती है तथा जब सीरम एक निश्चित शक्ति पर पहुँच जाता है तब इसे घोड़े से निकाल कर प्रतिदंशविष के रूप में उचित ढंग से रख लिया जाता है।

प्रकृति में सभी वस्तुयें हानिकारक व कष्ट-प्रद ही नहीं हैं वरन् वे बहुत ही लाभकारी व उपयोगी भी हैं। रसिल वाईपर का विष बहुत लाभकारी भी है; इसके द्वारा स्टाइपेन नामक औषधि तैयार होती है जोकि रक्त संबंधी रोगों में उपयोगी है; बहुत अधिक रक्त-स्राव होने पर भी इसे प्रयोग में लाते हैं।

मनुष्य सर्प की भय मिश्रित आदर भाव से देखते हैं। पौराणिक एवं साहित्य संदर्भों से विदित है कि सम्पूर्ण भारत में सर्प घर्मे, सम्भृता, लोक कथाओं तथा किंवदन्तियों के विषय रहे हैं और उन्हें सम्मान की दृष्टि से देखा जाता है; सर्प की पूजा संसार के विभिन्न भागों में होती रही है। जो सर्प विषैले नहीं हैं उनकी सुरक्षा वृहत् के विनाश के लिए अति आवश्यक है तथा जब वृहत् नहीं होंगे तो विषैले सर्पों की घरों में आने की सम्भावना बहुत कम रहती है।

विष के औषधियों के उपयोग में आने के कारण वृहत् से रक्षा के कारण इस लाभकारी जंतु का भी संरक्षण होना चाहिये।

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Breeding Emu, *Dromaius Novaehollandiae*, at Delhi Zoological Park

By

A.K. MALHOTRA

A pair of young Emus were received as gift from Australia in December 1953. Unfortunately the female died in 1966 and the male remained alone for a long period for want of a mate. In 1974 a female was obtained from Ahmedabad Zoo. The pair was released in a big open enclosure along with Kangaroos in the Australian section of the Park.

On 13th November, 1974 the female laid first egg in a corner of small room where the pair was regularly shut in during night. From 15th November to 2nd December 1974, she laid 6 more eggs at an interval of two to three days. The pair was observed to copulate frequently between 5th December to 13th December, 1974, thereafter, the female again laid a total of nine eggs at the same interval from 14th December 1974 to 9th January, 1975.

The male started showing interest in the eggs from 15th December 1974 and became very possessive. He prepared a nest of straw in a corner of the room and gathered all the eggs in the nest. From 11th January 1975 he started incubating the eggs. As the incubation progressed he became very aggressive and showed very little interest even in food given to him

The eggs were measured, weighed and marked with indelible India ink. The new-laid eggs averaged 482.1 gm. in weight (range 419 gm. to 570 gm.) and measured 126.3 mm $\times$ 83 mm (range 120-134 $\times$ 8-8.5).

Two chicks hatched out on 2nd March, five on 3rd March and one on 5th March after an incubation period ranging from 77 days to 54 days. The young chicks grew quickly on a diet of boiled eggs, cooked minced meat, bananas, soaked grams, diced carrots and chopped leafy vegetable especially cabbage and spinach. The chicks were released in open enclosure on 21st August, 1975 with the male Emu who played a significant role in rearing the chicks.

On the Collection of Water Bugs from District Saharanpur (Uttar Pradesh) (Hemiptera: Heteroptera)

By

MAHABIR PRASAD

Zoological Survey of India, Northern Regional Station, Dehra Dun.

This paper is based on the collection of water bugs collected from the district Saharanpur, Uttar Pradesh, by the member of the Northern Regional Station, Zoological Survey of India, Dehra Dun. The fauna of the water bugs of this area is inadequately known except for the reports of the Singh *et al.* (1955) and Roonwal *et al.* (1953), no comprehensive paper on the water bugs of this area is known.

The marked differences wherever observed from the published description (Distant, 1903, 1906) of the species are given.

Family Hydrometridae

Subfamily Gerrinae

Gerris spinolae (Lethierry & Sev.)

Material examined: Roorkee(3).

Eyes bottle-green; lateral sides of the body silvery-grey.

Known distribution: North-India (Calcutta and Bihar), Burma, Ceylon and China.

Metrocoris stali (Dohrn.)

Material examined: Beriware (14).

Known distribution: Bombay, Nilgiri Hills and Ceylon.

Ptilomera laticaudata (Hardwicke)

Material examined: Beriware (27) and Deoband (Kalinadi) (2).

Rostrum black and pronotum dark reddish-brown.

Known distribution: Dehra Dun (Kalsi), Nilgiri Hills, Burma, Ceylon, Malaya-Archipelago and Nepal.

Subfamily Hydrometrinae

Hydrometra vittata Stal.

Material examined: Pathri (4).

Known distribution: Bihar, Bargarh, Bombay, Saharanpur, Burma, Ceylon, Japan, Malaya-Peninsula, Philippines and Sham States.

Family	Naucoridae
Subfamily	Laccocorinae

Heleocoris ovatus Montandon

Material examined: Saharanpur (Dhamola river) (4) and Saharanpur (Padhoi river) (1).

Known distribution: Dehra Dun, Hamirpur and Hoshiarpur.

Family	Belostomatidae
<i>Lethocerus indicus</i>	(Lepelattier and Serv.)

Material examined: Nagli (Nakur) (2).

Head, pronotum and scutellum dark brownish-red; hemelytra dark-brown.

Known distribution: Bengal, Bihar, Bhowani, Bombay Dehra Dun, Madras, Trivandrum, Burma, Ceylon, Malaya-Peninsula, Java, North China Hills, Sind, Sumatra, Philippines and Tensserim.

Sphaerodema annulatum (Fabricius)

Material examined: Kakrala (Nakur) (5); Nakur (2); Kalinadi (Deoband) (1), Katha nadi (Nakur) (3); Nagli (Nakur) (7); and Sanpalia (Deoband) (5).

Known distribution: Bihar, Calcutta. Silhet and Sind.

Sphaerodema rusticum (Fabricius)

Material examined: Ajitpur (Laksar) (2); Saharanpur (Padhoi river) (4); Kishan Nagar (1) and Krishna river (Katchari) (3).

Rostrum yellow with brown tip; eyes may be black or brown and legs yellowish-brown.

Known distribution: Bihar, Bombay, Dehra Dun, Australia, Burma, Ceylon, China, Java, Malaya-Peninsula, Philippines, Sumatra and Siam.

Family	Nepidae
<i>Laccotrephes ruber</i>	(Linn.)

Material examined: Ganeshpur (16); Saharanpur (Dhamola river) (3); Kali nadi (Deoband) (1); Saharanpur (Padhoi river) (10); Sanpalia (Deoband) (6); Khekra nala (Nakur) (2) and Nagli (Nakur) (2).

Known distribution: Bombay, Calcutta, Dehra Dun, Kangra Valley, Kashmir, Naga Hills, North Khasi Hills, Borneo, Burma, Ceylon, China, Formosa, Japan and Sind.

Ranatra filiformis Fabricius

Material examined: Nagli (Nakur) (2); Saharanpur (Padhoi river) (2); Pathri forest (5); Sanpalia (Deoband) (6) and Krishna nadi (Deoband) (5).

Rostrum pale-yellow with black tip; eyes dark-brown or black; head pale-yellow; pronotum brown and anterior femora dark-brown.

Known distribution: Bihar.

Ranatra veripes (Stal.)

Material examined: Roorkee (13); Ganeshpur (40); Nagli (Nakur) (4); Kakaral (Nakur) (8); Sindhali (Nakur) (15), and Katha nadi (Nakur) (4).

Eyes black; rostrum may be pale-yellow or brown; hemelytra dark-brown and abdominal appendages brownish-yellow.

Known distribution: Bengal (Calcutta), Dehra Dun, Burma, Ceylon, and Nepal.

Family Notonectidae

Subfamily Notonectinae

Anisops niveus (Fabricius)

Material examined: Kakaral (Nakur) (35).

Rostrum pale-yellow with black tip; dusky spot on the pronotum absent.

Known distribution: Bihar, Bombay, Burma, Ceylon and throughout Ethiopian region.

Anisops bouvieri Kirk.

Material examined: Kakaral (Nakur) (50).

Known distribution: India (Assam), Burma, Ceylon, Malaya, New Guinea and Siam.

Family Corixidae

Corixa hieroglyphica Dufour

Material examined: Ganeshpur (4), and Kakaral (Nakur) (55).

Known distribution: Assam, Bihar, Bombay and North Bengal.

Summary

14 species of water bugs belonging to the families Hydrometridae, Naucoridae, Belostomatidae, Nepidae, Notonectidae and Corixidae have been recorded from Saharanpur.

Acknowledgements

The author is grateful to the Director, Zoological Survey of India, Calcutta for his kind permission to publish this work. Thanks are also due to Dr. B.S. Lamba, Deputy Director, and Dr. Asket Singh, Superintending Zoologist, Zoological Survey of India, Northern Regional Station, Dehra Dun, for providing facilities and going through the manuscript.

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Mating Season in Tiger in Palamau Tiger Reserve

By

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Introductions

Mating period in tiger has been variously mentioned in books and publications dealing with this aspect of reproductive biology of tiger. Whereas Sanderson (1912) holds that tigresses do not breed at any fixed season, Arjan Singh (1973) mentions that normally tigers mate in November-December or may and June. The observations of others, in this regard, are not as specific as these two definite statements. Prater (1971) says that in India many tigers seem to mate after rains and the majority of young are born between February and May. Stracey's (1968) contention is that in India the mating season is variable. In the sub-Himalaya it takes place in cold season, but in peninsular India there seems to be no well defined time for breeding. In the opinion of Guy Mountfort (1973), in temperate areas of their range they (tigresses) come into breeding condition seasonally, whereas in tropical regions they are sexually receptive for about a week at intervals of approximately one-and-a-half months. In fact, the vagueness of these observations leaves one in confusion in regard to mating period in tiger with the result one fails to take advantage of this period with confidence in planning the management practices in Tiger Reserves and fixing their priorities. Moreover, it is not apparent as to what methodology has been followed in arriving at these conclusions on mating period in tiger and whether or not they have any statistical background.

Schaller (1967) alone, has analysed the number of vocalizations of tiger recorded for every month of the year and then concludes that the peak of sexual activity was from November to February with some mating probably occurred throughout the year.

Admittedly, the social behaviour, physiological conditions and psychological attitude of Tiger generated by environmental conditions, apart from factors as degree of disturbance, lack of basic requirements etc. having direct influence on mating in tiger, may not have made it possible to identify the specific period of mating even if there occurs one but to a manager of a Tiger Reserve in India where to provide conducive habitat conditions even for survival of tiger is in itself a full time job, the identification of mating period, covering even 70% to 80% of total mating in the year, would be an important guiding factor in allotting the priority to his jobs.

Once the knowledge of mating period in a particular Tiger Reserve is acquired, it would enable the manager to take such measures as would ensure as far as possible the habitat conditions conducive for mating and prevent such practice as the cub-catching which was quite common in recent past in this region. Seshadri (1969) mentions "cub-catching in the Palamau and other forests of Bihar reached serious proportion in 1958. In that year, the sale of at least twelve cubs in nearby Daltonganj was traced".

With these considerations, observations are recorded in the Palamau Tiger Reserve to see, on their analysis, if any mating period may be identified to aid in achieving the basic objective of the Project Tiger. Materials so far available are not enough to be fed in any statistical formula in order that authenticated findings are arrived at but for the purpose of management of the Reserve, even a strong indication of mating period would be of great help at this stage.

Description of Palamau Tiger Reserve

The Palamau Tiger Reserve of 928 Sq. Km. was carved out in 1974 from the forest tracts which were then under very intensive management. Consequently, disturbance in high magnitude due to human presence prevailed throughout the year. High incidence of cattle grazing and annual forest fire together created conditions hostile to survival of the vegetation and wildlife. In fact, the basic requirement of wildlife were getting short in supply on all the fronts.

The Palamau Tiger Reserve is situated between latitudes 22.90°N and 23.40°N and longitudes 84°E and 84.60°E. It is in the southern portion of the district of Palamau in the State of Bihar. The climate in the Reserve is truly tropical with three seasons, summer, rains and winter. Day in summer is very hot, mercury touching 44°C whereas winter is quite severe when temperature goes down to 4°C. Rains occur mostly between mid June to mid October totalling upto 1700 m.m. The Reserve miserably lacks water during summer months.

Majority of the Reserve is covered with Dry Mixed Deciduous Forests of which the principal species are *Terminalia tomentosa*, *Anogeissus latifolia*, *Diospyrus melonoxylon*, *Lagerstrimia parviflora*, *Bridelia retusa*, *Acacia catechu*, *Bosuelia serrata* etc. Shrubs and small trees consist of *Zizyphus xylopara*, *Randia dumetorum*, *Aegle marmelos*, *Wendlandia tinctoria* etc. and occur mixed all over and often in pure patches too. The grass, though in low density on account of heavy grazing, responds to protection very quickly. The main species of grass are *Heteropogon contortus* and *Alpuda mutica*.

Apart from these forests, there occurs too dry peninsular sal forests as also moist mixed deciduous forests with large proportion of bamboo.

The principal species in the former type of forests is sal with associates of *Terminalia tomentosa*, *Pterocarpus marsupium*, *Anogeissus latifolia*, etc. The density of principal species varies according to soil, aspect and slopes. This type of forest too contains enough grass for herbivores. In moist deciduous type of forests, the principal species are *Terminalia tomentosa*, *Pterocarpus marsupium*, *Adina cordifolia*, *Bridelia retusa* under growth is comparatively dense but large size grassy blanks occur in places. Wherever bamboo has come in the understorey in these types of forests, the ground flora is lacking. Bamboo, itself, however, forms a good fodder for herbivores.

These forests, given due protection against injurious factors and forests working modified in interest of wildlife, would during very short period, provide an ideal habitat for tiger.

With two exceptions of comparatively heavy concentration in the northern and the central zone of the Reserve, the prey animals are uniformly distributed all over the Palamau Tiger Reserve. The main species are *Chital*, *Sambar*, *Wild boar*, *Blue Bull*, *Gaur* etc.

Observations and Their Analysis

In an attempt to identify the mating-period in tiger, if any, in the Palamau Tiger Reserve, observations are recorded on four counts. They are :—

- (1) Visual:—(Sighting of courtship and/or mating)
- (2) Vocalizations
- (3) Movement of tiger and tigress in association.
- (4) Size of the pug marks of cubs.

(1) Visual

As and when tiger and tigress are seen together in the process of courting and/or mating in the forests, entry is made in a record.

Tiger and tigress were seen in courtship on (1) the 4th January, 1972 at 20.00 Hrs. and again on (2) the 5th January, 1972 at 07.00 Hrs. On both the occasions the same pair was in courtship. Second time, courtship in tiger and tigress was seen on (3) the 14th June, 1972 at 11.00 Hrs.

(2) Vocalization

Vocalization in Tiger being infrequent, it is elicited only at the appearance of strong stimulus. Though nearly a dozen types of vocalization in tiger have been recognized, none has been identified to be exclusively elicited by particular stimulus. Sexually motivated tigresses do emit calls and so do the tigers in this situation, it is not possible to isolate the type of vocalization exclusively stimulated by sexual motivations. If, however, other

stimulii eliciting vocalizations are taken as constant throughout the year, its significant increase during any period of the year may be due to sexual motivation. Such period, if identified on analysis of vocalizations, may be taken as mating period in tiger.

With this end in view, the data of vocalizations were recorded and are reproduced in Table 1.

TABLE 1

Monthwise Number of Vocalizations

Month	Jan.	Feb.	March	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Nos. of vocalisation	1	3	1	2	Nil	Nil	1	2	3	2	Nil	4	19
% of the total	5.3	15.8	5.3	10.5	—	—	5.3	10.5	15.8	10.5	—	21.0	100

(3) Movement of Tiger and Tigress in Association:—

Since the social behaviour of tiger almost surely precludes the association of adult, independent tiger and tigress for purposes other than courtship—and mating, though exceptions are recorded, the mating period may be ascertained by recording the instances of adult, independent tiger and tigress, moving together. On this hypothesis, observations of movement of adult, independent tiger and tigresses have been recorded which are reproduced in Table 2.

TABLE 2

Details of Movement of Tiger and Tigress in Association

Sl. No.	Date of movement	Location of movement	Remarks
1	10.11.75	Ramandag—6	—
2	26.11.75	Saidupe—2 to Saidupe—6	
	4.12.75	Saidupe—6	The pair was the same.
3	4.12.75	Baresand—1	
4	16.12.75	Haratu to Ramandag—3	
5	19.3.76	Baresand—1 to Baresand—2	
	26.3.76	Baresand—1 to Ramandag—6	The pair was the same.
6	9.11.76	Baresand—15 to Baresand—11	
7	17.11.76	Baresand—10 to Maromar PF	
8	11.11.76	Haratu to Ramandag—5	
9	9.11.76	Kuku to Kumandih	
10	12.12.76	Baresand—9 to Baresand—1	

Monthwise percentage of movement of the different pair of tiger is shown in Table 3.

TABLE 3

[illegible]

TABLE 4
The mating time in tiger as arrived at on the analysis of pad size of cubs

Data of locating the cubs	No. of cubs	Size of pad in cms.	Estimated age of cub in months	Estimated time of mating	Remarks
20.11.76	2	6.9 6.6	8	Second week of December, 1975	The two cubs were of the same litter.
17.12.76	3	7.4 7.4 7.5	9	First week of December, 1975	The three cubs were of the same litter.
31.10.76	2	6.5 6.5	7	Middle of December, 1975	The two cubs were of the same litter.
14.2.75	3	6.5 6.3 6.3	7	Middle of March, 1975	The three cubs of the same litter.
18.10.75	1	6.5	7	First week of December, 1974	
27.10.75	1	6.4	7	2nd week of December, 1974	
18.12.76	1	6.0	6	First week of March, 1976	
26.12.76	1	7.0	8	First week of January, 1976	

(4) Size of the Pug Marks of Cubs

Once a correlation between the size of the pads of cubs with their age is established, it may be possible to ascertain the approximate time of mating by deducting the gestation period of the tigress from the birth of the cubs.

Sankhala—in "CHEETAL" Journal of the W.I.P.S. of India. Vol-17, No. 1—has established one such correlation which has been referred to arrive at the age of the cubs. Since at the adulthood, difference in the size of pads of tiger and tigress is significant whereas it is not so at young age, only such cases have been considered where the age of the cubs was found to be less than nine months. The mating time was arrived at by deducting 105 days (gestation period) from the birth time of the cubs. The results obtained in this way are reproduced in Table 4.

Monthwise mating as percentage of the total number of eight observations is given in Table 5.

TABLE 5

Months	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
% of total calculated mating	12.5	—	25	—	—	—	—	—	—	—	—	62.5

Conclusions

In the region in which the Palamau Tiger Reserve falls, three seasons, i.e., summer, rains and winter are reckoned as seasons forming a year. The months constituting these seasons are :

Summer :—Mid February to Mid June

Rains :— Mid June to Mid October

Winter :—Mid October to Mid February

Percentage of mating arrived at for every month by four different methods; if fitted in the seasons of the year, would give the result as reproduced in the Table 6.

TABLE 6

Methods	Seasons		
	Summer	Rains	Winter
Visual	50.0	—	50.0
Vocalizations	23.7	26.8	39.5
Movement of tigers and tigress in association	10.0		90.0
Size of the pug marks	25.0	—	75.0

Out of the four methods adopted in ascertaining independently the mating season in Tiger in the Palamau Tiger Reserve except for the Visual method that suggests mating in tiger occurring to the extent of 50% in summer and 50% in winter, the three others strongly

bring out that majority of mating occurs in winter and a few in summer. It may be noted that under visual method, only two observations could be recorded.

For the purposes of the management of the Palamau Tiger Reserve, the mating period in tiger may safely be said to extend over the winter season, i.e., mid October to mid February. This very closely corroborates the findings of Schaller.

It is admitted that number of observations are not large enough to put them under statistical analysis to arrive at a result to be acceptable in scientific world but the results strongly indicate the season of the year when majority of mating in tiger occurs. This finding would enable the manager of the Palamau Tiger Reserve to take measures in time to provide most conducive conditions for mating as also to prevent the mortality in cubs and their loss by catching, etc.

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Summary

Mating period in tiger has been variously mentioned in the books and publications dealing with this aspect of reproductive biology of Tiger. To a manager of Tiger Reserve, mating period in Tiger, if there is found to be one, would be of great assistance in planning his management practice and in fixing its priorities.

With this end in view observations have been recorded on four counts in the Palamau Tiger Reserve. They are visual, vocalizations, movement of tiger and tigress in association and the size of pads of cubs upto nine months in age.

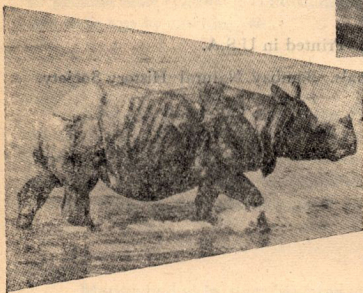
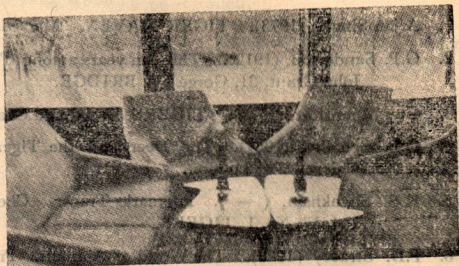
On monthwise segregation of these observations and fitting them within three different seasons of the year generally recognized in this region, it is strongly indicated that majority of mating in tiger occurs during winter season which covers the period between mid of October to mid of February followed by summer, i.e., mid February to mid June. Only the observations on vocalization, on analysis, indicate the possibility of some mating occurring in rains whereas the other three categories of observations indicate no mating during the rains. For the purpose of management Palamau Tiger Reserve, winter season may be taken as mating-season in tiger.

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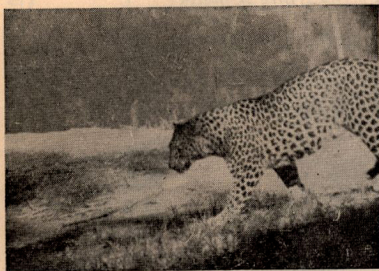
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